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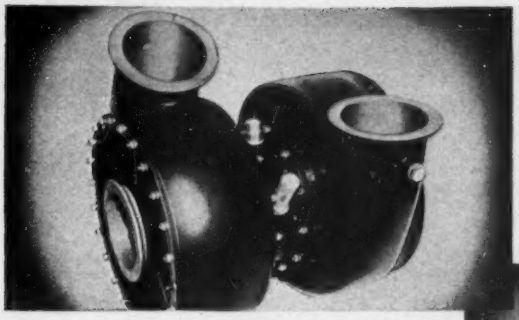

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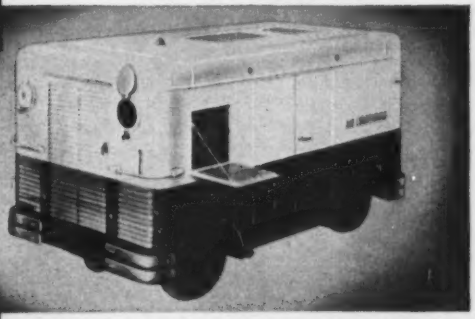

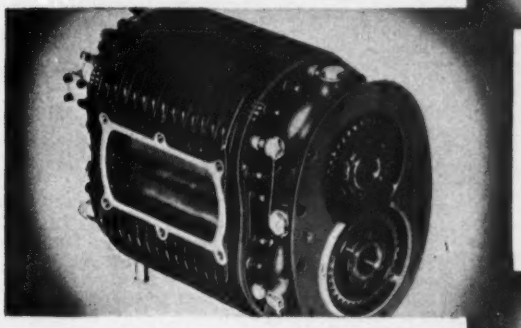

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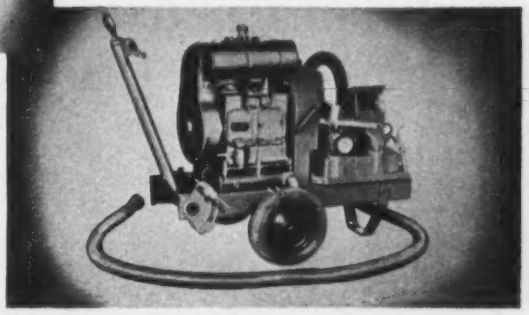

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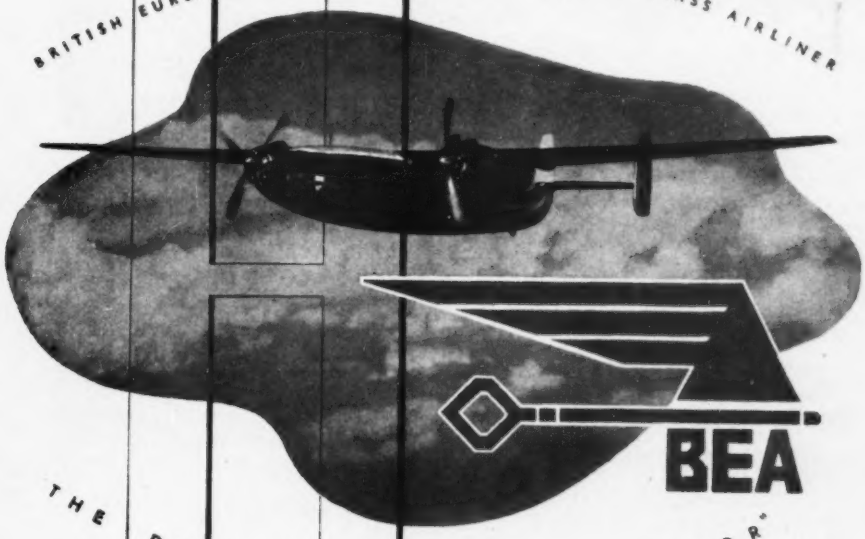

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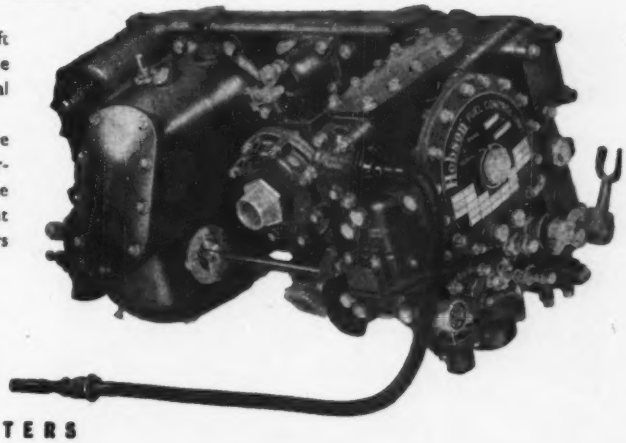

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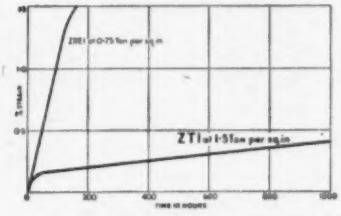

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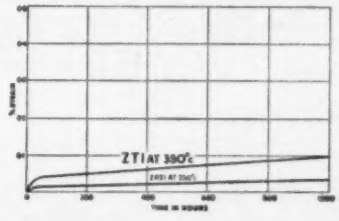

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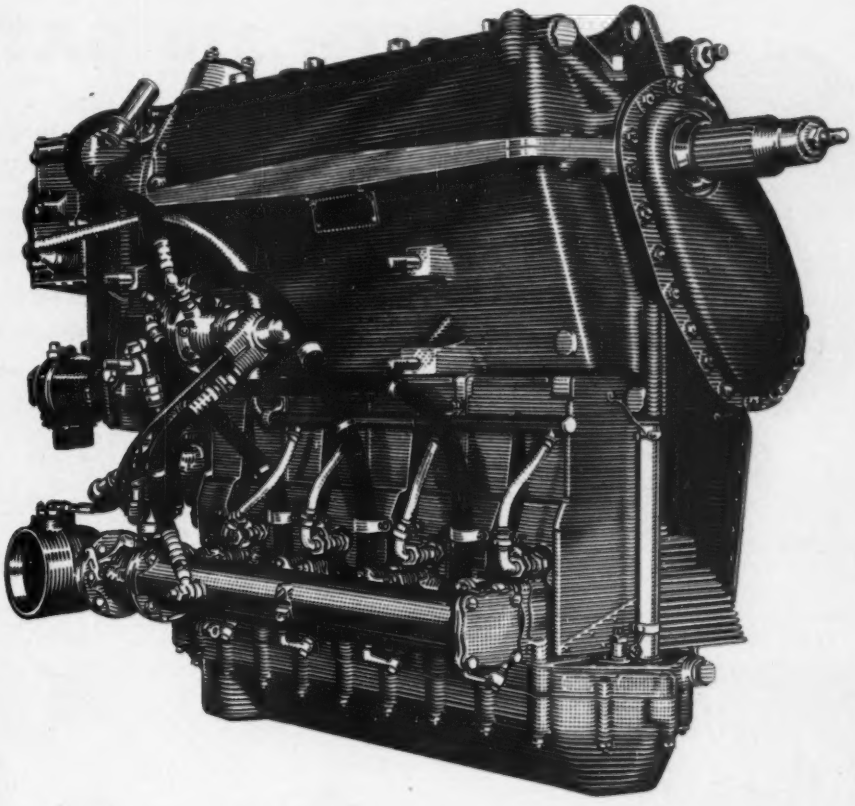

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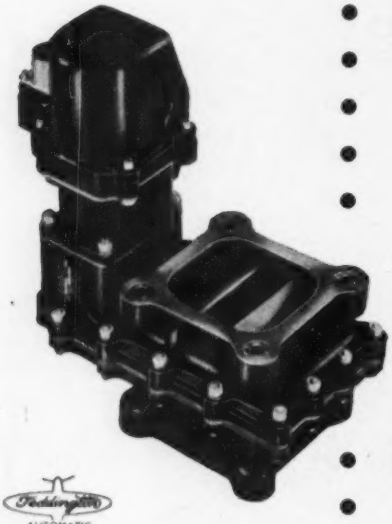

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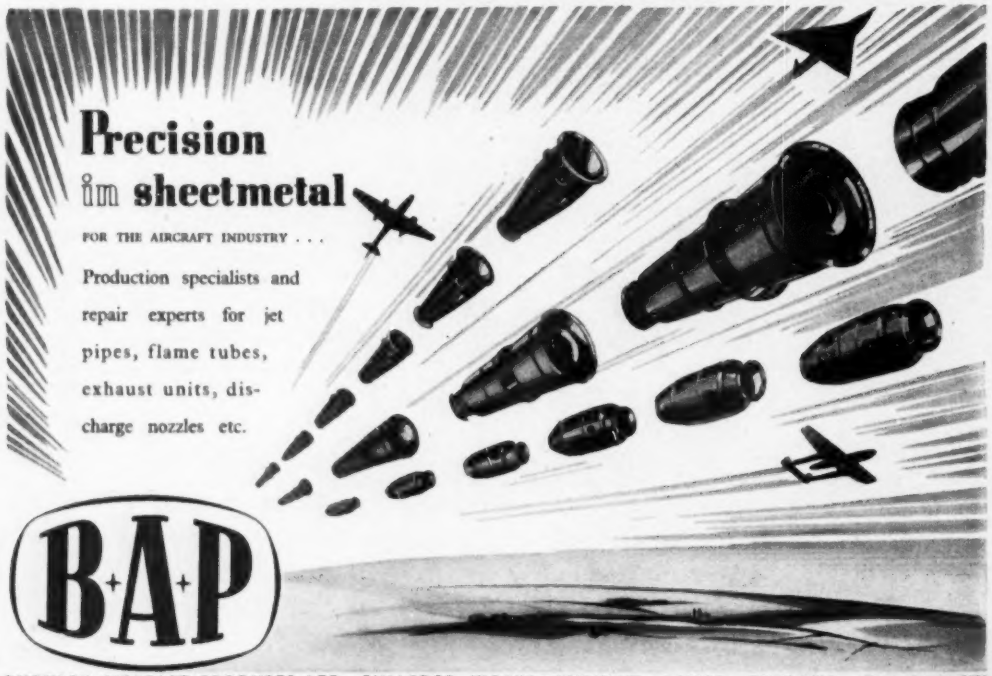

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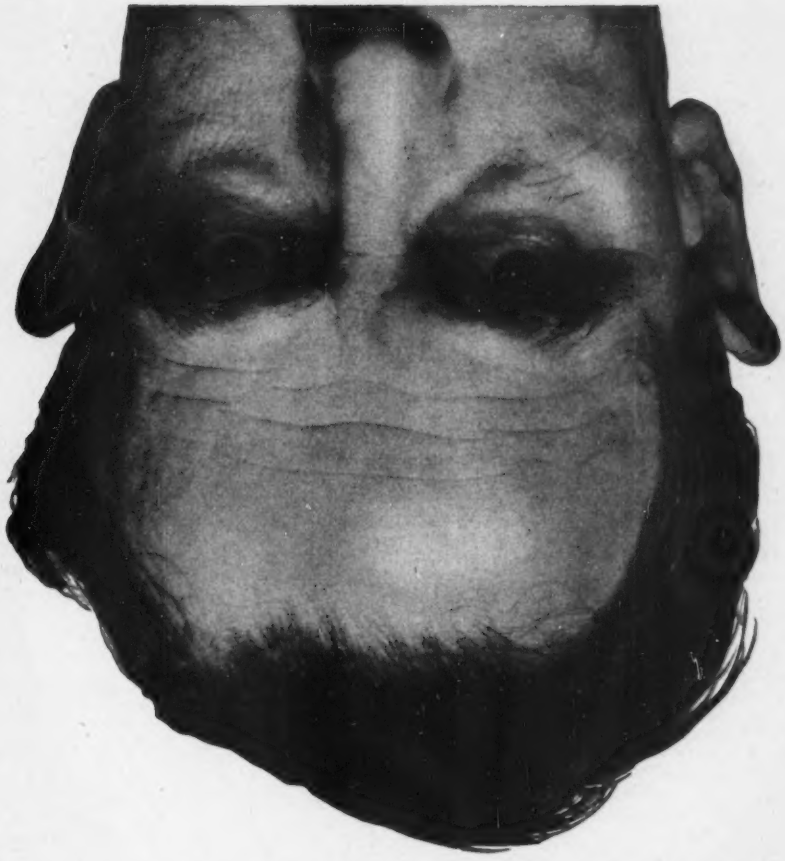

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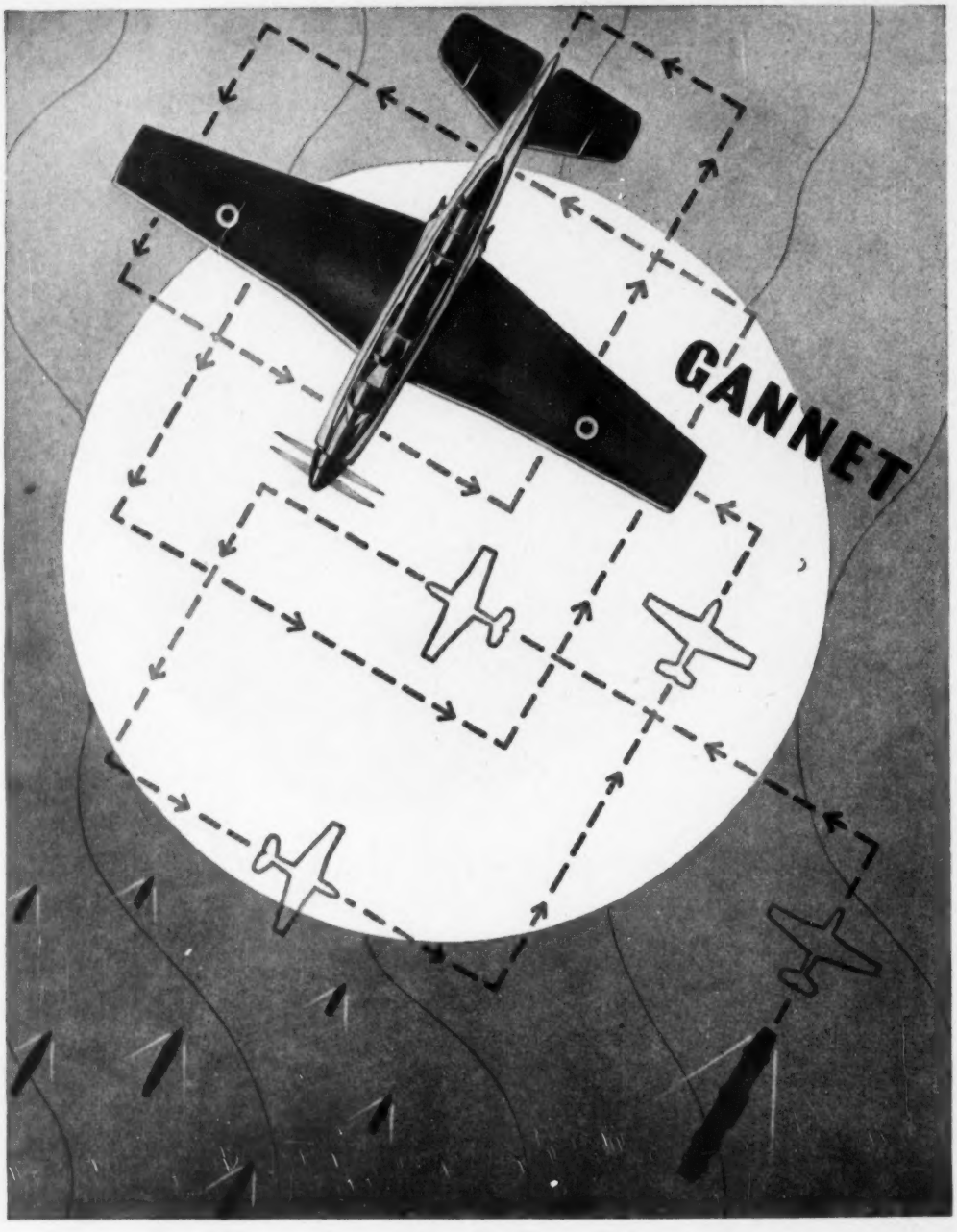

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Royal Reviews

THERE is much satisfaction in knowing that there is to be a fly-past of naval aircraft—among them helicopters—in the Coronation Naval Review at Spithead next year. Remarkably enough, only two days after this most agreeable piece of news was made public, Her Majesty's visit to the Royal Naval Air Station at Lee-on-Solent became the first occasion on which a monarch has been escorted by rotating-wing aircraft. They were Westland-Sikorsky Dragonflies of the type which played a perilous and altogether meritorious part in the Monte Bello atomic experiment, and which is now replacing the old Sea Otter amphibian as the standard air/sea rescue vehicle of Naval Aviation.

This happy linking of events prompts reflection on the Royal Air Force Review which, though it has not yet been formally announced, must surely proclaim the dawning of our New Elizabethan age. One recalls the first R.A.F. review in history, on July 6th, 1935, when the ceremony was in two parts—a ground review at Mildenhall and a mass fly-past at Duxford. Those who were privileged to be present will never forget the rows upon rows of Furies, Gauntlets, Bulldogs, Harts, Overstrands and Heyfords arrayed before His Majesty King George V. The Prince of Wales arrived in a Rapide, and of the flying display it was recorded in *Flight* that as the first machines drew level (they were Heyfords flying at 100 m.p.h.) the King "rose to the salute, which he held until the last machine of the group had passed." Then, the might of the Service having been reviewed, and the thunderous droning having faded in the distance, the King stepped from the dais. "Once again," one reads, "the royal salute was given and the crowd rose as a man."

Today, many of the junior officers who took part in that historic ceremony hold air rank. Now it is the turn of the young men who, by next summer, will be manning the Meteors, Venoms, Sabres, Canberras (and, dare we venture to hope, the Swifts and Hunters?) to look forward to a similarly indelible experience.

Guns *and* Butter

A STRONG feeling exists within the industry—and, we believe, in Government circles as well—that civil aircraft with a high export potential are as important to the country as war materials. Put another way, if production of such aircraft as the Comet, Viscount and Britannia shows signs of lagging behind foreign orders for them, then these aircraft should be allotted some form of super-priority to place them on an equal footing with Hunters, Valiants and Javelins. Latest indications are that civil targets will be met without any appreciable effect on military production, or vice versa.

Last week an all-important Canadian contract for Viscounts was announced, bringing the total of orders for these aircraft up to 75. Yet at one time it seemed unavoidable that production of Viscounts would be severely limited by the inability to manufacture sufficient numbers of Dart turboprops—due to preoccupation with Avon development and production. Now Rolls-Royce have stated that there is no risk of a bottleneck, and what is more, it seems, a fear of a similar limitation on Griffon production for Shackletons no longer exists. These are signs of a change in focus as well as an indication of satisfactory progress with Avons.

The Air League of the British Empire has estimated that between three and four thousand large passenger- and cargo-carrying aircraft will be required over the next five or ten years, while a manufacturer with even closer interest in the market believes that a conservative estimate of the requirements for the next ten years is £1,000 million-worth of aircraft. And this takes into account only scheduled airlines, and is based on current civil values. Such are the export prospects.

In his broadcast speech at Manchester (see page 663), the Secretary of State for Air indicated that Government policy was in keeping with the changed state of affairs. He said: "It would be wrong so to overload the aircraft industry with military orders as to crowd out civil types. In the long run the aircraft industry will be much stronger—and our military potential greatly enhanced—when it becomes much more widely based on civil as well as military production."

THE QUEEN AT LEE-ON-SOLENT

"Flight" photographs

(Left) The Sea Hawk formation above is probably the largest of this type yet seen. On the right, Her Majesty is arriving at the control tower, accompanied by Vice-Admiral C. E. Lambe, Flag Officer (Air) Home.

DESPITE bad weather, the full programme was adhered to when Her Majesty the Queen visited the Royal Navy's Home Air Command at Lee-on-Solent on Friday last. It was the first time a reigning monarch had made a formal inspection of the Command and contingents —totalling some 1,500 officers and ratings—from all the sixteen stations constituting the Command were present.

Her Majesty travelled by train to Brockhurst Station, where she was received by the Duke of Wellington, Lord Lieutenant of Hampshire; Mr. J. P. L. Thomas, First Lord of the Admiralty; Admiral Sir John Edelsten, C-in-C. Portsmouth, and Ald. C. B. Osborn, Mayor of Gosport.

With a novel escort of two Dragonfly (S-51) helicopters, flying on each side of the royal car, less than 100 yards distant and at a height of 150ft, the Queen drove through cheering crowds to the Royal Naval barracks at Lee-on-Solent where a royal salute was given by a naval guard of honour.

After inspecting the guard, the Queen drove slowly along the runway, where over 100 naval aircraft of all types were assembled, together with representatives of the various stations of the Command. The aircraft included Meteors, Sea Hawks, Vampires, Attackers, Sea Hornets, Sea Furies, Firebrands and Fireflies. On reaching the end of the line she left her car in order to inspect a review party, which included pilots and aircrew detailed to take part in the fly-past. The Queen spoke to a number of them and showed considerable interest in the Gannet, which was in the charge of Peter Twiss, the Fairey test pilot. At the conclusion of the inspection Her Majesty lunched with Vice-Admiral C. E. Lambe, Flag Officer Air (Home) in the wardroom.

After lunch the weather cleared sufficiently for the fly-past to take place. Aircraft of the 11 squadrons present took part, led by Rear Admiral W. T. Couchman in one of the eight Westland-Sikorsky S-51s of No. 705 Training Squadron. The Queen watched the fly-past from the control tower.

Again escorted by two Dragonflies, Her Majesty left by car for Fareham Station, where she joined the royal train. Before leaving the Queen gave the traditional order for the mainbrace to be spliced, and sent the following message to Vice-Admiral Lambe: "Please convey my sincere congratulations to all ranks and ratings of the Home Air Command who were at Lee-on-Solent today. I was deeply interested in all I saw and was much impressed by the fly-past and the smart appearance of all those under your Command."

On the left, the Queen is having features of the super-priority Fairey Gannet anti-submarine aircraft (Armstrong Siddeley Double Mamba turbo-prop) explained to her by Fairey test pilot Peter Twiss. In the background is a Hawker Sea-Hawk (R-R. Nene). Below are seven of eight Westland-Sikorsky Dragonfly helicopters (Alvis Leonides) of first formation in the fly-past, and at lower right Her Majesty is inspecting Naval aircrew.

"Flight" photographs (right)

"Air Power in its Widest Sense"

Noteworthy Speeches at Manchester's Dinner to the Secretary of State for Air

A SPLENDID occasion for Manchester was the dinner given in the Town Hall on Thursday, November 20th, in honour of Lord De L'Isle and Dudley, V.C., Secretary of State for Air and President of the Air Council, and also the Council of the Air League of the British Empire. A large number of Manchester's most distinguished citizens assembled to dine with senior officers of the R.A.F. and of the air forces of many other countries. The Lord Mayor of Manchester, Alderman Douglas Gosling, O.B.E., J.P., was in the chair, and the trumpeters of the Central Band of the Royal Air Force added colour to an already brilliant affair.

The Lord Mayor's speech was most appropriate to the occasion and to his office. First he welcomed many distinguished guests, in particular Lord De L'Isle and Dudley—the subject of his toast—and he had a special welcome, warmly applauded, for senior officers of the United States Air Force. He said that Manchester was proud of its aeronautical associations over many years, and recalled with pride the first Atlantic flight by Alcock and Brown, two Manchester men. Manchester was justly proud, too, of its Ringway Airport, but also had great ambitions for its further development. He visualized aircraft carrying passengers and merchandise direct into Ringway just as ships from all parts of the world came up the Manchester Ship Canal to the heart of a great industrial area. He referred to the wartime production of aircraft, particularly Lancasters, and concluded with a tribute from Manchester to the Royal Air Force, to those who had helped to build it, and to those who now maintained it.

The Minister's masterly speech in reply to the toast was phrased with his radio audience, in addition to the guests at dinner, in mind. Some people had been led to expect an important announcement, but this was not the intention. He surveyed the aviation field as it is today, interpolating pungent and often witty comment, and occasionally adding a new fact or figure.

Lord De L'Isle and Dudley said that he was proud to be the guest on this splendid occasion—the more so because his fellow guest was Air Chief Marshal Sir Guy Garrod, chairman of the Air League—and he told the Lord Mayor that he was looking forward keenly to the ceremony of the parading of the Colour of the Royal Air Force in Manchester on April 1st next year. He then continued: "We have now reached a critical point in a great revolution in transport. We take pride that we are at the head of development and design in aviation. But we have no time slowly and deliberately to consider the situation. Perilously poised and dependent, all fifty million of us, on maintaining ourselves as a great power and as a centre of trade, industry and finance—the heart of a world-wide connection—we must not fall back in the race."

The Minister said that despite his special responsibilities for the R.A.F. he deliberately referred to air power in its widest sense. As the result of the jet engine we could now build far better, bigger and more effective aircraft. "We can now conceive an aircraft leaving England at noon, climbing to 45,000 or 50,000 feet in smooth, swift flight, and delivering its load of 150 passengers in, say, Egypt, by tea-time. The recent move of a battalion of Lancashire Fusiliers and much of its equipment from Egypt to Kenya, some 2,000 miles, was completed in three days. This will easily be surpassed when this new aircraft, which is a development of the Valiant bomber, is in service."

He went on to say that by the end of 1952 some 400,000 people would have crossed the Atlantic by air during the year without a jet airliner in service on that route. The startling fact was that in the air reality had caught up with imagination. But besides science and invention we needed highly qualified technicians—and in numbers—to become a leading air-faring nation. Here was a challenge to technical education.

Lord De L'Isle and Dudley then spoke of the difficulties of production—there were 15,000 drawings to be made for the Comet 1 alone. He said: "My colleague, the Minister of Supply, tells me that he is well satisfied with the way in which industry has co-operated with the Ministry in making this super-priority scheme work. Certainly air power dominates the international scene today. The freedom of the Western World in these post-war years has been shielded by the American strategic air force. It is dangerous and misleading to go on measuring the military strength of nations merely in army divisions. Old habits die hard, but to continue the practice might well lead internationally to a misapplication of scarce resources. The Western Powers cannot afford this. The air battle in all its aspects must settle the outcome of any future struggle, and not the shock of armies or of rival fleets. By sea as well as land, air power is both shield and spearhead."

NEWS IN THE SPEECHES

IMPORTANT items of information emerged from the speeches by the Secretary of State for Air and Sir Roy Dobson, reported on this page. In brief, they are as follows:—

•

A troop transport development of the Valiant bomber is officially foreseen. One transport version of the Valiant might be capable of carrying 150 passengers at 45-50,000ft for 2,000 miles (England to Egypt) in four hours (noon to tea-time).

•

The first Supermarine Swift squadron of Fighter Command should be operational by June, 1953, and a Hunter squadron not long after.

•

Both guided and unguided missiles are being developed for our fighter aircraft which will sharply increase their efficiency in defence.

•

Sir Frederick Handley Page will, it is hoped, have something very good to display in the bomber field in the near future.

•

The present Government see no definite end to the period of rearmament. The conception of the late Government seemed to be a spurt, spending £4,700 million, production being limited only by the industry's capacity, after which question would be "where do we go from here?"

•

It is the official opinion that it would be wrong so to overload the aircraft industry with military orders as to crowd out civil types.

•

Sales of aviation goods overseas this year totalled £43 million. Next year's figure has been reckoned at £60 million.

•

A civil transport version of the Avro Vulcan would be capable of carrying 150 passengers and their luggage from Ringway to New York direct (with normal reserves this is equivalent to 5,100 miles still-air range) at over 40,000ft and make the return trip and another back to New York all within a 24-hour period, allowing two or three hours on the ground between flights.

Lord De L'Isle and Dudley next remarked: "The general public has been remarkably patient in waiting for a swept-wing fighter to appear in R.A.F. squadrons. The American Sabre began coming into service in 1949, and the Russian Mig 15 in the same year."

A well-known man in the aircraft industry had said to him, "What you don't order or don't order in good time, you don't get in good time." However, in the Battle of Britain fly-past we had had a foretaste of what was to be when "that great test pilot" Neville Duke flew a Hunter at the end of the great procession. The Minister continued: "I am happy to say that we can now look forward to seeing the first squadrons of Swifts in Fighter Command by June next year. I hope the Hunters will not be far behind." When these modern fighters had arrived they should lead the field. The Minister mentioned a number of new aircraft by name, and added that the Canberras now touring South America had made a great impression on that continent. Venoms, he said, were now going into service in Germany for ground-attack work. We were pushing ahead with the production of the Valiant medium bomber, and believed it would prove the finest long-range high-flying bomber in the world. Coming along after it was the delta-wing Vulcan—a Manchester product of which the great Avro works could be justly proud. He hoped it would not be long before Sir Frederick Handley Page would also have something very good to display in the bomber field.

"We must never allow ourselves to fall behind in the quality of the aircraft with which the R.A.F. is armed," said Lord De L'Isle and Dudley. "Quantity must never come before quality. The aim must be to have the best machines carrying the best armament which can be devised. This means improvements to the power of the fighter to shoot down attacking forces and improvements to the security and precision of aim by our bomber force. Both unguided and guided missiles are being developed for fighter aircraft. Their efficiency as our defenders will then be very sharply increased."

The Minister then called the attention of "all lively, adventurous young men" to the great career that was open to them in commissioned service in the R.A.F.

With the explosion of the first British atom bomb the potential

"AIR POWER IN ITS WIDEST SENSE" . . .

power of the R.A.F. had immensely increased. We must prepare the best possible air defences in this country, but we ought never to deny ourselves the power of reaching out and hitting the enemy where he comes from. The Minister congratulated all those concerned with the improvement of our radar chain—work which had been given the highest priority.

Turning to the subject of the rearmament programme, the Minister said:

"When the rearmament programme, known as the £4,700m. programme, was finally conceived by the late Government, it was planned that the expansion programme of the Royal Air Force should be limited only by the capacity of the aircraft industry to produce the aeroplanes. The sudden swift expansion was thought of as a great spurt. When the effort had been completed, and £4,700m (or thereabouts) expended, it would somehow provide the solution to the question—somewhere about March, 1954—'where do we go from here?' Her Majesty's present Ministers have not been able to discover any such end to the period during which Great Britain and her Allies ought to arm. We have had to bend our thoughts to the solution of the problem. 'How are we to continue to make our contribution to Western defence, not merely for a short period but, it may be, for a long time, while maintaining our economic strength?'

"This altered conception does not mean that we can ease up in our rearmament effort," continued the Minister, "but it does mean a very careful assessing of ends and means; of the balance between the Services; of the shape and the size of the expansion of the Royal Air Force itself, which must still expand. It would be wrong, for instance, so to overload the aircraft industry with military orders as to crowd out civil types.

"In the long run, the aircraft industry will be much stronger—and our military potential greatly enhanced—when it becomes much more widely based on civil as well as military production. Stability must be the aim; alternating boom and slump are no basis for a healthy industry."

Speaking next of Halton, which he visited recently, the Minister said that lads from 15 to 17½ received a splendid training there to fit them for a career in the Service, with no limit to the height which they could climb up the ladder. He added: "We are getting some first-class lads, but not enough—and only a small minority come from the North and the Midlands. I think this ought to be put right."

Aircraft Exports

Regarding aviation exports, Lord De L'Isle and Dudley said that during 1952 we had sold some 43 million pounds' worth of aviation goods, and next year it would be about 60 million. For comparison, the ship-building industry would sell this year some 32 million pounds' worth of ships overseas. Selling aircraft abroad for us as a nation was good business. "It cannot be wise, however," he said, "merely to sell our best machines abroad and lack courage or finance to run some of them ourselves. We have built ships, sold ships, and still have the largest active merchant fleet in the world. This must be our aim in the air. I believe that the market for passenger travel and even more for freight, is only beginning to grow. We must aim at obtaining the maximum share."

The Minister went on to say that we were justly proud of the record and performance of B.O.A.C. and B.E.A. They had been admirable pioneers on the great air routes of the world, had a splendid record for safe flying, and there were fresh fields for them to conquer. But traffic promoted traffic, and we could not afford to be timid or restrictionist. The Government was anxious to see scope allowed for private enterprise, and the Air Ministry was certainly encouraging private enterprise in the air. This year, to date, over 70,000 Servicemen and women had been conveyed by air to and from the Middle East by the independent companies. It was not only quicker than by sea, but cheaper.

Having referred to the foresight of the founders of the Air League of the British Empire, whose proud task it was "to act as a trumpet to call the attention of our people to the vital need for air power," Lord De L'Isle and Dudley concluded: "Within our grasp is a great prize—the creation of air power of such quality and strength that we need not fear for the future of the Commonwealth. I do not mean only the military power of the Royal Air Force: I include also the Air Forces of the Commonwealth, close-linked with the R.A.F. and modelled upon it; I include the civil air fleets of the Commonwealth, which have pioneered the massive system of air commerce which is open to us to create; and I include the scientific, technical and industrial strength which sustains the whole.

"The challenge must find a response in the hearts of all who value the British spirit which has never been laggard in voyaging into the unknown—I mean the challenge to go out and conquer the airways as our fathers bestrode the seas."

Sir Roy Dobson, managing director of A. V. Roe, was characteristically forthright when he proposed "The Air League of the British Empire" and immediately took the Secretary of State for Air to task over some of the points in his speech. Sir Roy repeated that the only reason that we have been short of aircraft such as swept-wing fighters was because they had not been ordered. When certain of his American friends had praised British inventiveness and design skill but said that the industry could not produce the aircraft, he countered this impression by offering to take on any American orders and prove it to be wrong, adding at the same time that the job would be done at two-thirds the cost as compared with the American manufacturers.

He next took up cudgels on behalf of Avro's Vulcan delta bomber, recalling that the Minister had said that the Valiant would prove the finest long-range high-flying bomber in the world. He said that the Vulcan would fly higher, faster, and carry a heavier load farther than any other jet bomber now flying. He referred to a civil delta transport similar to the Vulcan, and said that to give an idea of its performance it would be able to carry 150 passengers with their baggage ("and perhaps a bit of freight") from Ringway direct to New York; then, after an hour or two on the ground, fly back to Ringway, and after a further hour or two, fly back once more to New York—all in the same day.

Sir Roy expressed the opinion that in the event of another war, whether we won or lost, this country would be finished, and therefore it was essential to do everything possible to prevent war, and he believed this could be done provided we were strong enough.

Air Chief Marshal Sir Guy Garrod, chairman of the Air League of the British Empire, was the final speaker. He referred to the remarkable vision and foresight of the founders of the Air League when, over forty years ago, they set forth their objects in the following terms: "To disseminate knowledge and spread information showing the vital importance to the British Empire of air supremacy on which its commerce, communications, defence and its very existence must largely depend."

Air League's Present Aims

Sir Guy then went on to say that the League was at present mainly preoccupied with two aims set forth by the founders, the first of which was Colonial development, which could be greatly speeded up by the use of aviation. He talked of the provision of maps, saying that mapping could be carried out from the air not only with great speed, but also with great accuracy, and he went on to mention the enormous areas of the Colonial territory which from the economic development point of view were virtually unexplored, but for which aerial surveying could do so much. He added that during the last five years new electronic methods of aerial prospecting for minerals which did not outcrop had been developed in North America. Then there was the subject of surveying for purposes of agricultural development and the scope for the expansion of crop preservation by aerial spraying.

While still considering the contributions to Colonial development which aviation could make, Sir Guy said that air transport was the outstanding need of many parts of the Colonial Empire. It was virtually independent of the nature of the country over which it was desired to carry goods. He went on to describe in some detail American and Canadian projects in the far north of Canada which had been wholly dependent upon the air for their supplies and equipment.

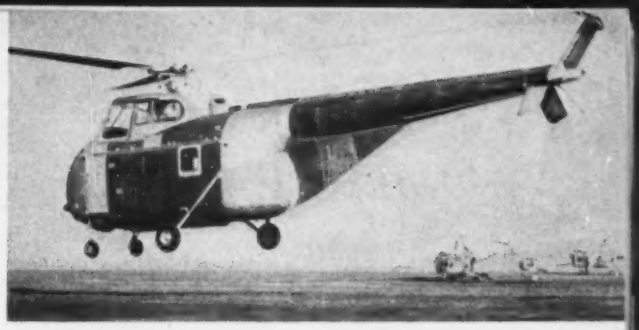
Of the League's second pre-occupation at the moment, Sir Guy said: "The Secretary of State has given some truly impressive figures about the progress of air transport during recent years. These figures are the measure of our two great opportunities. One is to capture the world air carriage market, particularly in cargo; the other is to capture the world market in the sale of transport aircraft, which is now wide open to this country." The size of the market for such transport aircraft was impressive. Some 477 Constellations and 260 DC-6s were at present in service or on order. Adding other four-engined transport aircraft now in service which would have to be replaced, the total was about 1,000. If twin-engined aircraft were included, the world market for passenger and cargo aircraft over the next five or ten years might be between 3,000 and 4,000."

Sir Guy said that if the independent companies were allowed to operate services that carried a reasonable guarantee of security for ten to fifteen years, he was convinced that the finance would be forthcoming from commercial circles for the modern air fleet which they required. We had no time to lose. There were at this moment six regular all-cargo services across the Atlantic, and not one of them was British.

It might well be that the commercial risk involved in manufacturing passenger and cargo aircraft in advance of specific orders is such as to call for substantial backing from Government sources. There was ample precedent for that in the case of the Queen Mary and the Queen Elizabeth, which were financed and insured, with extensive Government support, to serve that national interest.

Finally, Sir Guy said: "The faith of the Air League is this: if we make up our minds to become as great an airfaring people as in the past we have been a nation of seafarers, we shall assure our future as a great commercial nation, and also the defence of our homes and of our way of life."

FROM ALL QUARTERS



EN NÉGLIGÉ : Looking a little undressed in its priming paint, the first Westland S-55 gets off the ground (see news on this page). The airframe—including metal rotor-blades—is entirely of British manufacture.

Seven Hundred—All But

SUBJECT to F.A.I. confirmation, a North American F-86D Sabre single-seat all-weather fighter has broken the world's landplane speed record by averaging 699.9 m.p.h. over a 3-km course at Thermal, California. The pilot was Capt. J. Slade Nash, U.S.A.F., whose four low-level runs were observed by representatives of the F.A.I. and National Aeronautics Association, and the course lay by the Salton Sea, a lake about 235ft below sea level. Under the conditions prevailing, the speed of sound was estimated to be about 775 m.p.h.; thus, the Mach number was almost exactly 0.9. The present official record of 670.98 m.p.h. was set up as long ago as September 15th, 1948, and stands to the credit of Major Richard L. Johnson, U.S.A.F., who flew an early (F-86A) Sabre.

The F-86D is powered with a General Electric J-47 turbojet, fitted with an afterburner. No guns are mounted, but 24 rocket projectiles can be discharged from a special retractable launcher in the belly of the fuselage. The F-86A's record was established with the machine carrying full war load, and there is no reason to suppose that the "D" was not flying under similar conditions.

It is well known that speeds of the same order as the new record were set up at Farnborough this year by the Hawker Hunter, D.H.110 and Vickers-Supermarine Swift; nevertheless, we convey congratulations to Capt. Slade Nash, the U.S.A.F., and the manufacturers of the aircraft and power plant.

New M.C.A. Parliamentary Secretary

FOLLOWING Mr. Reginald Maudling's appointment, announced last Tuesday, as Economic Secretary to the Treasury, the post of Parliamentary Secretary to the Ministry of Civil Aviation goes to Mr. John Profumo, O.B.E., M.P. for Stratford-on-Avon. Mr. Profumo—who is 37 years of age and had a distinguished record in the war, in which he rose to the rank of brigadier—is the holder of a Private Pilot's Licence.

Canadian-built Britannias?

REPORTS that the Britannia might be built under licence in Canada have been endorsed by the following statement, issued by the Bristol Aeroplane Co., Ltd., on November 21st: "While the negotiations between the Canadian Government and the Bristol Aeroplane Co., reported from Montreal, have related primarily to a maritime-reconnaissance aircraft based on the Bristol Britannia, there is also keen interest in the possibility of building in Canada transport Britannias, whether for military or civil use; Canadair, Ltd., of Montreal, and the Bristol Aeroplane Co. are working together on plans for the most effective sales exploitation of their combined resources. These plans do not exclude the probability of increased production of Britannias in the United Kingdom, both at Filton and elsewhere."

There is also news of the projected freighter version of the Britannia, which, it is hoped, will enter service with B.O.A.C. in 1954-55. The formal order, for five machines, is still subject to Government approval, but the Bristol Aeroplane Co. have received B.O.A.C.'s "letter of intent"; it was signed by Sir Miles Thomas, chairman of the Corporation, during the television programme referred to on page 666.

R.A.F.V.R. Training: Important Changes

IT is now possible to confirm the truth of rumours, current for some months past, about radical changes that are to be made in the policy for acceptance and training of R.A.F.V.R. pilots. A question on the matter was to be asked in the House of Commons yesterday, November 27th.

Quality rather than quantity is to be the watchword in future. Much stricter standards are to be applied in the re-selection of serving pilots when their current engagements expire. Men most likely to be retained are those who, young in physique and temperament, are potentially capable of standing up to the very exacting conditions to be expected in a future war, and of adapting themselves to the changed methods of training likely to be necessary. Pilots are already being re-classified in categories based on such factors as age, experience and operational usefulness. Selection, also, will be governed by the fact that available training resources will have to cater for the progressively increasing numbers of National Service pilots who will go into the Reserve.

Those who satisfy the new requirements are to be retained for either two years or one year, depending on individual experience and qualifications.

It is also possible to confirm that the London (No. 81) Reserve Centre at Hallam Street, W.1, is shortly to move out to Kenley Airfield. This is the outcome of the policy outlined by the Under-Secretary of State for Air last July, whereby non-continuous training of ground personnel at Reserve Centres will be discontinued; a progressive reduction in the number of Centres will accordingly take place and, in fact, eight have already been closed down. As the new quarters at airfields will be of a simple nature, the move will have considerable economy value.

Westland S-55 Progress

AS we briefly recorded last week, the first entirely Westland-built Sikorsky S-55 made its initial flight at Yeovil on November 12th, and on this page we illustrate the event. S/L. D. A. S. Colvin, D.F.C., was the pilot, and he made three hovering flights, each of five minutes' duration. He was able to report the handling as completely satisfactory.

The aircraft is now being stripped preparatory to a series of ground-running trials, which are likely to occupy about 50 hours.

Further S-55s are coming along well, and it is expected that by the end of the year four will have taken the air.

S.M.A.E. Celebrate

OVER 200 members and guests of the Society of Model Aeronautical Engineers—the governing body of the sport in Great Britain—held their annual dinner and dance in London last Saturday, with A. Cdre. Whitney Straight as guest of honour. An account of the proceedings will appear next week.

Farnborough Film

EACH year the "Farnborough" film made by the Shell Film Unit in co-operation with the R.A.E. and S.B.A.C. earns well-deserved commendation, and the 1952 edition, now ready, is no exception. This year the newest aircraft have been dealt with separately and at some length, and, once again, the air-to-air shots are particularly enthralling. The Hunter and D.H.110 are seen—and heard—going through the barrier.

Peter de Normanville was the director, and the camera team were Sidney Beadle, Maurice Ford and Eric Chamberlain.

Photo-elastic Stress Analysis

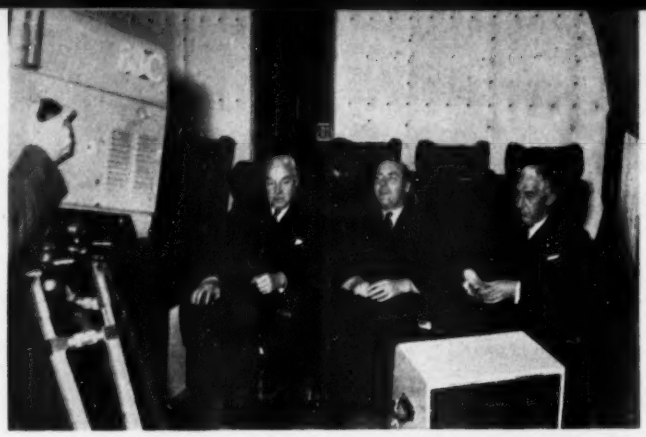
THE title of the R.Ae.S. main lecture, due to be given last night by Col. H. T. Jessop, T.D., M.Sc., F.Inst.P., was *The Scope and Limitations of the Photo-elastic Method of Stress Analysis*. The paper showed how, for practical checking of stress calculations, the photo-elastic method was rapid, inexpensive and "the only accurate way" of studying internal and highly localized stress-concentrations.

One method was the two-dimensional technique, strictly applicable only to flat, uniform plates with loads, acting in the plane of the plate, applied at the edges. For such cases, and simple three-dimensional cases, the "frozen-stress" method was suitable, examination being by (a) two-dimensional polariscope technique using a thin slice of the model, (b) the observation of scattered-light fringes from a narrow pencil of light passing through an uncut model, or (c) the use of polarized light with a thin slice of the model on a universal tilting stage.

After the regions of investigation and the particular case of stresses in fillets had been described, the extent to which results could be legitimately transferred from model to prototype was discussed, with the aid of several fringe-pattern photographs and diagrams. In general the accuracy of the optical observations was high, the main sources of error appearing in the photo-elastic material itself, in the construction of the model, and in the reproduction of the prototype loading conditions.

Although photo-elasticity could not answer all stress-distribution questions, it could in certain vital problems yield reliable information obtainable by no other method.

HERE AND THERE



FACING THE TELEVISION CAMERA in the lounge of the Bristol Brabazon, during the broadcast referred to below, are (left to right) Sir Miles Thomas, B.B.C. commentator Frank Gillard, and Mr. C. F. Uwins. Sir Miles spoke on the operator's viewpoint, and Mr. Uwins on that of the constructor.

Woomera's New Chief

THE new chief superintendent of the Long-range Weapons Establishment at Salisbury and Woomera is Dr. C. F. Bareford, head of the Mullard research laboratories. He was formerly a physicist in the Naval Scientific Service.

Peat as Turbine Fuel

AN open-cycle gas turbine burning raw peat has run successfully at the works of its designers, Ruston and Hornsby, Ltd., of Lincoln. About two-thirds of the heavy water-content of the peat is first removed; exhaust heat does the rest of the drying.

Flapped but Unflung

SPEAKING at a Roadfarers' Club luncheon in London last week, S/L. Neville Duke said that "the bangs we are making at present" should not break windows. The actual pressure-wave was quite weak; it would make trouser-legs flap, or rattle loose windows. "At Dunsfold we hear tales of people being flung off bicycles by the bangs—but I don't believe them." Of the Hawker Hunter, S/L. Duke said: "I would be quite happy now for any squadron pilot to come along, take it up, and put it through the speed of sound. He will not get into trouble."

Looking and Listening Down West

THE Britannia, Type 173 helicopter and other Bristol aircraft were the stars of a notable B.B.C. television broadcast, *Aircraft of Britain*, last week: and the "supporting players" included Sir Miles Thomas, chairman of B.O.A.C., who told viewers of the Corporation's Britannia and Comet plans; Mr. C. F. Uwins, managing director of the Bristol aircraft division; and Dr. S. G. Hooker, chief engineer, engine division. Next evening, in the Light Programme *Just the Job* series, several members of Gloster Aircraft discussed their daily work; they included S/L. Bill Waterton (chief test pilot), who succintly remarked, *apropos* his job, that the only way to discover the qualities of a new aircraft was "to suck it and see."

Mme. Auriol Honoured

PRESIDENT TRUMAN last week presented the Harmon "International Airatrix" Trophy to Mme. Jacqueline Auriol, daughter-in-law of the French president. In 1952 she flew a Vampire over the 100-km closed circuit at 508.8 m.p.h.—a women's record.

Sabre Snippets

TO the anniversary number of *Luffenham Talepipe* ("The Hottest Thing East of the Atlantic"), we are indebted for the following snippets concerning a year's Sabre operations in Great Britain. A chronicler of the deeds of 441 Squadron relates how, "in the clagged-up blue of Blighty," the Sabres have been going about their work. To the squadron, he reports, came A.V-M. Atcherley, G/C. Gonsell and W/C. Bird Wilson of the R.A.F., and Messrs. Gibb and Capper from Bristol Aircraft, to check out in the Sabre. Sonic booms, he goes on, had echoed through the quiet English countryside, and down at Farnborough (where F/O. Gar Brine was dropping them for scientific measurement), it was rumoured that a few windows were broken. The squadron had tangled many times with R.A.F. Meteors and U.S.A.F. F-84s, and over the R/T. these immortal words had been heard: "Blue leader, come on down. I've got four Meteors cornered." It is also learned, incidentally, that No. 1 (F) Wing did the first target-towing trials in the R.C.A.F. with Sabres, and that the Wing has the only 1,000ft firing-in butt in the Service.

In August Surroundings

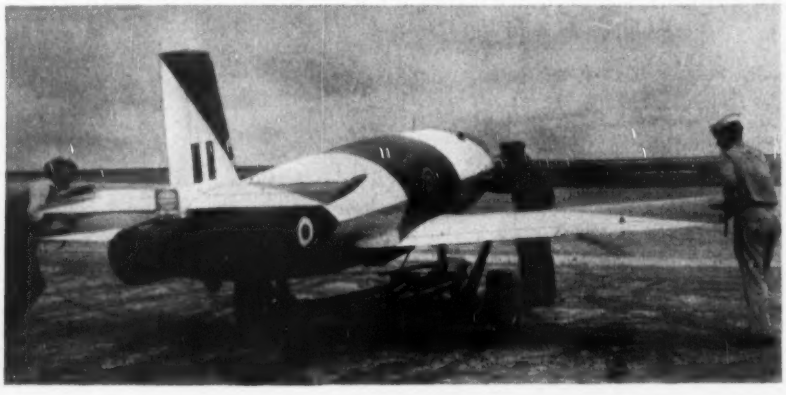
FOR its sixth all-England recognition contest, due to take place on January 17th, the Aircraft Recognition Society has been granted the use of the lecture-hall of the Royal Institution. This will enable over 70 teams to be accommodated, and a number of spectators as well.

R-R. Diesels

A DIESEL-ENGINE division of Rolls-Royce, Ltd., has been formed, to manufacture engines of 70 to 250 h.p., mainly for transport and industrial uses. This is the first new Rolls-Royce division since World War I, when the aero division was formed.

Aircraft Golfers

THE Aircraft Golfing Society recently held its annual dinner-dance, attended by 250 members and friends. During the season, matches have been played against teams from the majority of the big aircraft-constructors. There are a few vacancies for membership (open to members of the industry) next year: details from the hon. secretary, Mr. B. D. Songhurst, 40 Haven Green Court, London, W.5.



PILOTLESS: A new picture, from Woomera, of the Jindivik radio-controlled aircraft. Features include a tail parachute and trailing-edge dive-brakes. This particular machine, prototype No. 3, is powered with an Armstrong Siddeley Adder, as were Nos. 1 and 2; production machines—likely to be built in quantity by the Australian Chrysler company—will have the Viper.

AT201

NOW—Viscounts for Trans-Canada Air Lines

This order for 15 Viscounts—to be completed before the end of 1955—is the biggest single dollar-earner won by a British company since the war. The Viscount will be the first turbine-engined aircraft of any type operating on a large scale in North America. The fact that TCA have ordered the Viscount is proof of its suitability for all North American operators.

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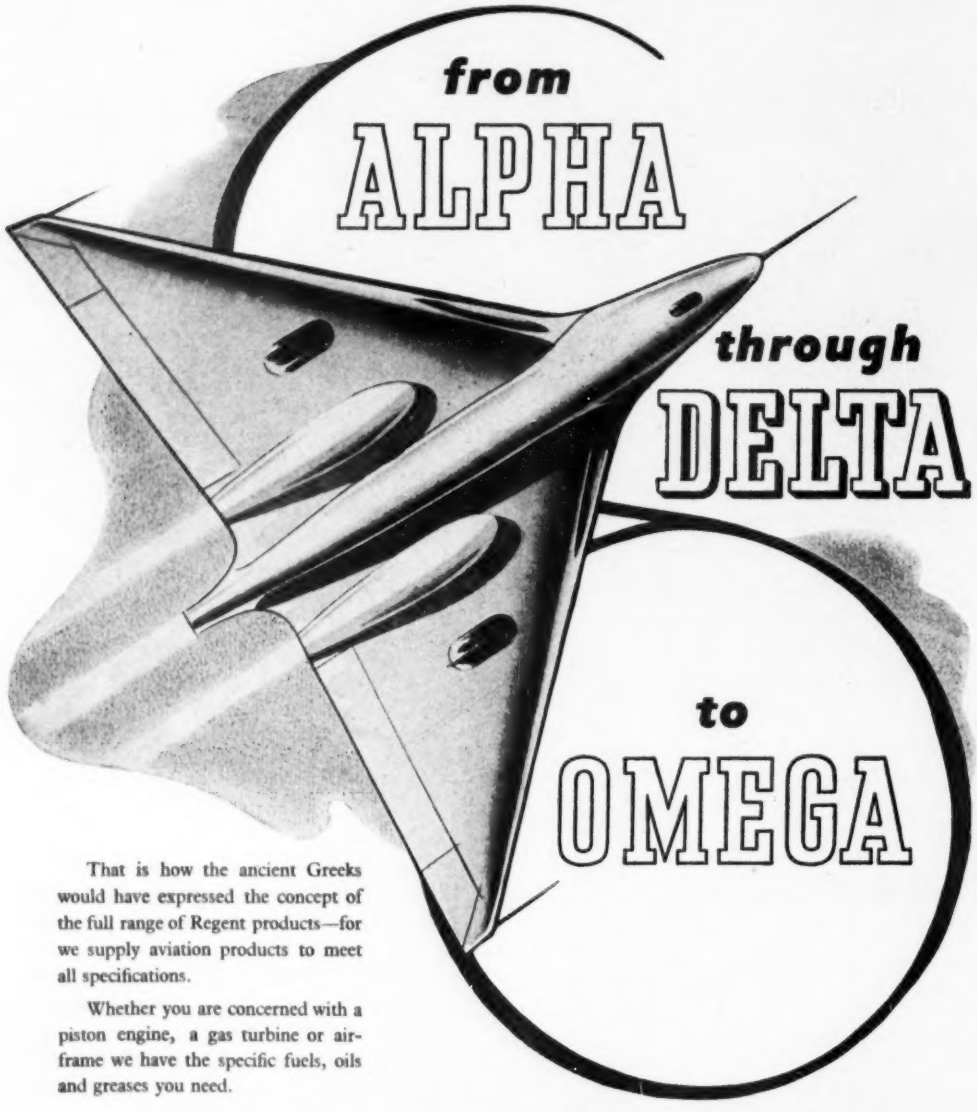

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AIRCRAFT INTELLIGENCE

SIDE ARMS: Thus termed by Lockheed the new "pods", each containing twelve 2.75 in Aeromite rockets, and now added to the wing of the F-94C Starfire, are supplementary to the ring of 24 rockets carried in the nose of the machine. U.S.A.F. Starfires will be retrospectively modified.

Great Britain

Supermarine 508 Development. The type-number 529 is allotted a development of the Supermarine 508 twin-Avon naval fighter, according to the Spanish journal *Revista de Aeronautica*. The Supermarine 529 is stated to be intended for quantity production and to feature swept wings and a revised tail unit.

Stretched Britannia. It is widely reported that the Bristol Aeroplane Company is studying a longer version of the Britannia with a 123ft fuselage. The total payload is given as 13,500 kg (29,900 lb), and the tourist accommodation as 128 passengers. No confirmation is given to this by the company concerned.

English Electric Four-jet Bomber. The French *Aviation Magazine* has announced that the English Electric Company is at work on a new bomber which, like the Short S.A./4, is powered by four turbojets mounted in two lateral nacelles, each nacelle housing two engines one above the other. English Electric say "no comment."

Short S.A./4 Test-bed. Although several magazines have recently published reports to the effect that a Short S.A./4 test-bed was about to fly with two Avons in the lower half of each nacelle and two Bristol Olympus in the upper positions, such an arrangement has not, to the best of our knowledge, been proceeded with.

Vickers Viscount 800. Such is the rumoured designation of the "Super Viscount." The prototype 800 is stated to be due for testing in 1955 and to have a stretched fuselage seating 80; engines are quoted as four Napier Elands. (Mr. George Edwards, Vickers' designer, "knows nothing" of this project).

France

S.N.C.A.S.E. Sea Venom. The first of a batch of French-built Sea Venoms made its maiden flight at Marignane on October 31st, well in advance of the contract date set by the French Navy. De Havilland Ghost turbojets for the S.E.-built Sea Venoms are constructed in Italy.

Marcel Dassault Fighters. Sub-types of this family are as follows: M.D. 450 Ouragan, straight wing, Hispano Nene, in production and in service; M.D. 451 Aladdin, two-seat night fighter, not built; M.D. 452-1 Mystére, Hispano Nene, swept version of Ouragan; M.D. 452-2 Mystére, supersonic fighter now coming in to large-scale production, Hispano Tay or SNECMA Atar 101C; M.D. 453 Mystére de Nuit, night and all-weather fighter, radar nose and lateral intakes; M.D. 452-4 or 454 Mystére, latest prototype with more sweep and afterburner to Tay or Atar turbojet, single-seat, 260 on "off-shore" order for NATO from U.S. funds; M.D. 452-5, prototype now under construction with SNECMA Vulcain turbojet of 10,500 lb. thrust.

Matra Cantinieau MC 101 Helicopter. This, the latest French helicopter, made its first flight on November 11th. The simplified mechanical conception of the machine is claimed to be "revolutionary" and to offer a new solution to the rotating wing problem. At the controls on the first flight was Gérard Henry. On November 12th the machine was flown from Buc to Toussus-le-Noble.

Ju 88 with Ramjets. On test at Mélun-Villaroche is a Ju 88 equipped with two ramjets designed by the Arsenal l'Aéronautique. Testing of these ramjets (which are intended for various purposes, but primarily for guided missiles) began this year in the Turboméca wind tunnel at Bordes and experiments are also to be conducted at the Modane research centre.

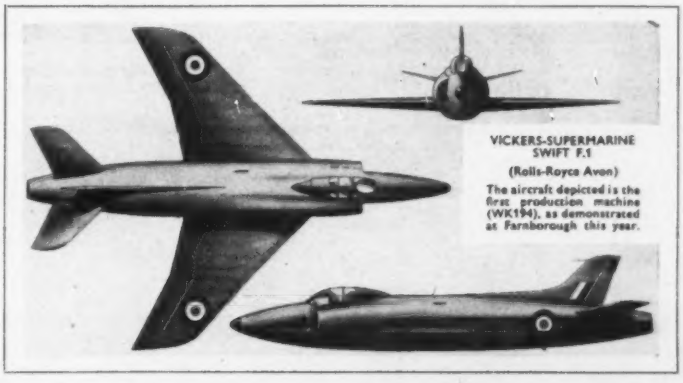
Latecoère 631. Now being operated by France-Hydro, the Latecoère 631 No. 08 six-engined flying-boat (span 188 ft 4in) has an interesting and meritorious record. First utilized by S.E.M.A.F., the machine completed 611 hours' flying with that organization. Later it completed over 16 hr flying at a flight test centre and latterly—since its employment by France-Hydro—it has completed 277 hr in the air. Flying time to date is 904 hr 20 min. On the Africa and Indo-China runs "No. 08" has completed 16 round trips and has transported a total of 296.5 tons of freight.

Languedoc with Hispano-Suiza Turbojet. At the request of the French Air Ministry, the Hispano-Suiza concern has been experimenting since 1949 with afterburning. The Nene has already been cleared for use with this post-combustion system, and adaptation of the Tay is now in hand. Since July this year a Nene with afterburner has been on test in a Languedoc and ten flights have been made up to medium heights. Certain items of aircraft equipment formerly lacking have now been supplied and the Languedoc will shortly be taken to its ceiling (about 36,000ft).

S.O.30P with Turboméca Palas. At Mérignac in the S.F.E.R.M.A. factory (a branch of S.N.C.A.S.O.) two Turboméca Palas auxiliary turbojets are being affixed to the wings of a S.O.30P Bretagne. It is understood that Air Maroc intend to equip all their S.O.30P Bretagnes with these eminently useful aids. (See pages 673-675).

Italy

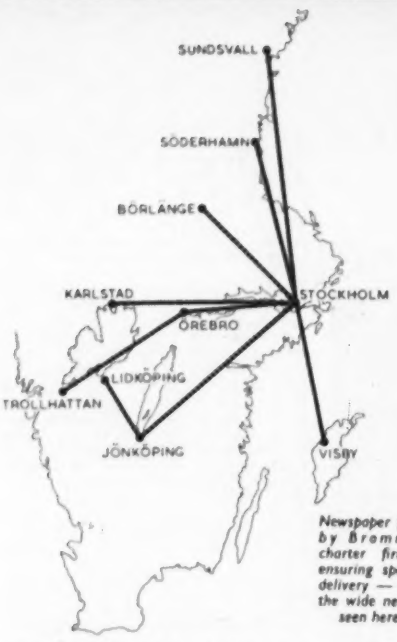
Swept-wing Ambrosinis. Now flying in Italy is the Ambrosini Freccia, a small experimental piston-engined machine based on the S.7 trainer, but claimed to be the first aircraft constructed in the Continent of Europe with a wing swept back at an angle of 45 deg. Apparently a similar wing will be fitted to the Saggittario, a light fighter trainer having a turboméca Marbore II turbojet of 880 lb static thrust installed in the nose, with the efflux beneath the fuselage *à la* Yak-15.



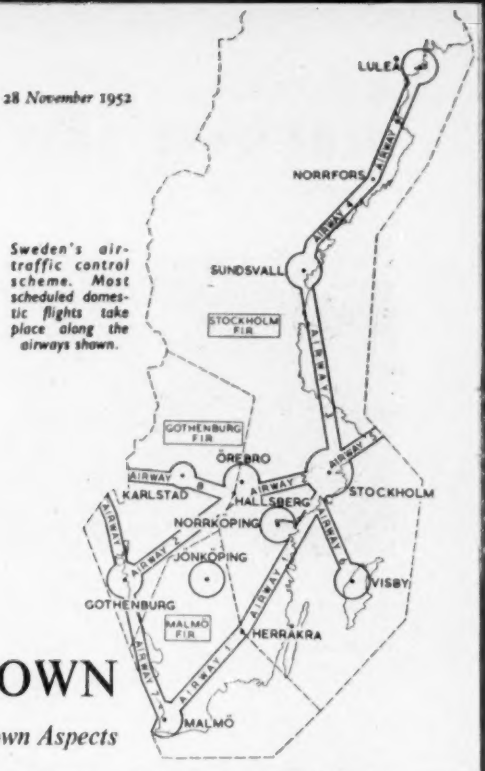
VICKERS-SUPERMARINE SWIFT F.1

(Rolls-Royce Avon)

The aircraft depicted is the first production machine (WK194), as demonstrated at Farnborough this year.



Newspaper flights by Bromma's charter firms — ensuring speedier delivery — cover the wide network seen here.



Sweden's air-traffic control scheme. Most scheduled domestic flights take place along the airways shown.

STOCKHOLM TOUCHDOWN

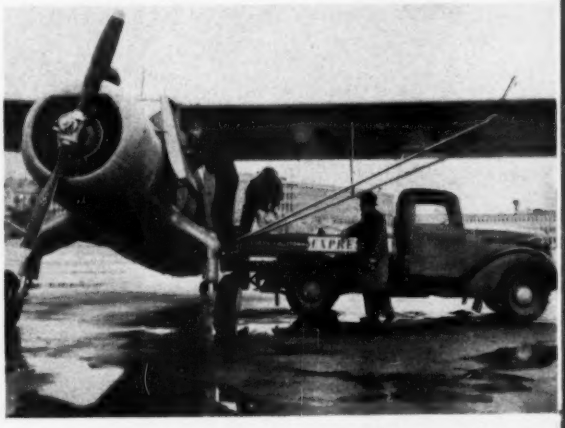
Varied Activity at Bromma Airport : Some Lesser-known Aspects

MODERN international airports, it is often said, have become increasingly alike. The same types of aircraft of the same big airlines land, taxi in, disgorge similar groups of what might be called standard international travellers, refuel from identically-labelled bowsers, fill up with further groups of standard travellers no different from those so recently dispensed, taxi out, and take-off—to repeat the same performance, after variable time intervals, elsewhere. The only indications of the nationality of a particular airport are claimed to be the background scenery, possibly just visible behind the hangars or in the far distance; and the language in which "no admission" is painted on the doors.

This may indeed be generally true, and yet on a recent visit to Stockholm we found much there to disprove the rule. At Bromma, in addition to the international services which give the airport its main importance, there is other aerial activity, smaller in scale but of novel and unusual interest. On our visit we were able to obtain a glimpse of some of this activity, and also to look into the general development of the airport and its place in the Swedish air traffic control scheme.

From the main building, the sight of a Ju 52/3M on the far side of the airport prompted a first call on the charter firms who fly the daily "newspaper runs" from Bromma. These flights, started in February, 1950, by Captain Köhnke in his Fokker F-8, are now flown by four charter companies, and cover a radius of approximately 200 miles from Bromma. The companies and their fleets are Aero-Nord, with two Lodestars and one Consul; Ahrenbergsflyg, with four Ju 52/3Ms; Airtaco, with three Lodestars, two Avro XIXs, one Anson and one Lockheed 12; and Transair, with three Consuls. The idea of faster newspaper delivery, by air, originated in a wish to satisfy the summer-time demand of people on the west coast of Sweden. The first method adopted was to send the papers by rail to Gothenberg, and then fly them to the west coast resorts. This was soon replaced by the speedier method of flying the papers to Lidköping and, from there, completing the distribution by rail. The present area of distribution, shown on the map, now spreads not only west, but also north, south-west and south-east (to Gotland Island) from Stockholm.

Morning papers are flown to Visby, on Gotland, but the main traffic consists of afternoon papers, which are flown daily to all the towns served. Of the airfields used, only four are equipped for air-traffic control, and three of the others are "B"-class airfields, which are not permanently staffed and which belong to the Royal Swedish Air Force. The use of V.H.F. communication and radio compasses makes possible two-crew and one-crew operation, and a large number of the flights are made under I.F.R. conditions.



One of the "Dagens Nyheter" newspaper's own aircraft, this Norduyn Norseman is here being used for delivery work.

The sight of Lodestars being loaded with papers and then taking off emphasized the simplicity and economy of operation which has been achieved. On some of these aircraft, passengers also are carried on the return trips, while the Ju 52/3Ms carry passengers on both outward and return trips.

We received details of the charter companies' newspaper operations from Captain Stig Lindström, of the *Dagens Nyheter* newspaper, who mentioned that some of the publishers, also, were operating their own aircraft. The *Dagens Nyheter* and *Expressen* (morning and afternoon papers of the same publishing firm) maintain for their own use one Norduyn Norseman and one Grumman Widgeon amphibian, which are used for a variety of purposes, including transport of journalists, aerial photography, and delivery work.

Another Bromma company, Ostermans Aero, operates a fleet consisting entirely of helicopters and light amphibians, which fact

alone proved sufficiently intriguing to merit a visit to their Bromma offices. The company's Bell 47-D-1 helicopters are used for many purposes, including ambulance, rescue and postal work, crop-dusting and spraying, sightseeing flights and military assignments. One helicopter is permanently based at Stockholm from December to April, in readiness for ambulance and rescue flights among the many lakes and islands surrounding the city. The County Communal General Hospital at Mörby, just outside Stockholm, has cleared a special helicopter landing-space near the hospital buildings, so that most patients from the archipelago can be flown direct to the hospital. Time between the receipt of an alarm and the take-off is normally about twenty minutes during the day, and 40-50 minutes at night, when the pilot and mechanic on duty are at home. This year approximately 35 emergency ambulance flights have been made, including a number by night.

During the winter, a scheduled helicopter mail service is operated from Bromma to seven principal islands in the Stockholm archipelago at a frequency of two flights per week, carrying approximately 100 kg of letters, newspapers and packages per flight. Round-trip distances are about 120 km, all the landing places used are situated close to the local post offices, and the flying time per trip varies between one-and-a-half and two hours. This service was started in 1948, and has continued each year (with the exception of 1949) since then. The helicopters have been used, also, for other special purposes during the winter seasons, when the ice on the archipelago is often too thick for boats to break, but too thin or too rough for conventional aircraft to use. Geographically, the district is ideally suited to helicopter operation and, just as important, a keen interest in the development of this form of transport is taken by the Government, local authorities and the public.

The machines have been used also for the dusting and spraying of large areas of forest and crops, and for search and rescue flights to crashed aircraft, ice-bound boats and snow-bound villages in the north. For the last two years, one machine has been specially based in Jämtland during the tourist season for search and rescue duties in this mountainous region, and next year another new project is to be the examination by helicopter of a new cross-country power cable.

The company's eight Seabee amphibians, also, are equally useful in operation over archipelagoes such as that of Stockholm. In addition to special charter work, and general-purpose use for the main Osterman company, three Seabees are employed on ambulance duties during the summer months over this region.

Accompanied by Herr Göran Wallert, technical manager, we visited the firm's workshops, where development work was in progress on a specially designed winch for helicopter use, and on a rescue chair to be attached to the end of the winch cable. Already designed and built for the company's ambulance work is a new lightweight stretcher which, when attached outboard, connects with the helicopter cabin, enabling the medical attendant (the second crew-member) to attend to the patient during flight; the stretcher attachment is enclosed by a transparent blister.

A brief visit to the office of Herr Bertil Florman, airport commandant, produced some information on the total amount of traffic at Bromma. The airport was opened in May, 1936, and during that year handled 5,338 aircraft movements. This annual number increased to 12,979 in 1939, and then dropped during the war years, to rise again to 12,452 in 1944, during which year considerable extensions to the airport's runways took place. This expansion coincided with the creation of the Royal Board of Civil Aviation (Kungliga Luftfartsstyrelsen), a new Government department. Since that year Bromma's traffic has increased further, and the number of movements in 1951 was 37,780. The Olympic Games in Helsinki this year again increased traffic to a great extent and, indeed, made necessary the construction of additional passenger-handling facilities. The number of landings made at Bromma (on international flights alone) during July this year was 1,154, compared with 602 during July, 1951. The number of passengers passing through the airport has increased more than twelve fold since its opening year, from 20,234 in 1936 to 277,169 in 1951.

A Bell 47-D-1 of the Ostermans company, fitted with special stretcher attachment and rescue chair. Based at Bromma, these helicopters are used extensively for ambulance, rescue and mail flights over Northern Sweden and the Stockholm area.

The chief controller, Herr T. Anderson, then showed us around the control room, the briefing room, and the control tower. Stockholm is one of the area control centres for the three Swedish flight-information regions, the other two being Malmö and Gothenberg. The main scheduled domestic flights take place along the airways shown in the second diagram on the opposite page. V.H.F. stations at Orebro, Norrköping, Nässjö, Karlstad, Dingle, Falköping, Halmstad and Almhult, as well as at the three control centres, provide coverage over practically the whole of the Swedish mainland below 60 deg N. In addition to the facilities at the main airports, there are 22 non-directional medium-frequency radio beacons spaced along the airways and in the airport control zones; those at Norrfors, Hallsberg and Herrakra are shown on the opposite page.

An important unit based at Bromma is the rescue co-ordination centre for Swedish civil aviation, which co-operates closely with the air safety centre of the Royal Swedish Air Force. Catalina amphibians based at Hägernäs are used for long-range rescue work, and there are medium-range ambulance aircraft at Luleå, Hägernäs and Ostersund.

Finally, we looked at the extent of the scheduled services to and from Bromma: on the day of our visit the number of aircraft movements was 45 (excluding newspaper and other charter flights), of which 35 were on international flights. Sixteen of these were to Helsinki (mostly direct), flown by S.A.S., Finnish Airlines and Czechoslovak Airlines.

Plans for Bromma's future include the extension of runway 31-13 and the construction of a new runway. A new airport at Halmsjön, north of Stockholm, has been planned, and will eventually take over the long-range flights to and from the city, while Bromma will deal with domestic and European traffic. This traffic will doubtless continue to include for many years that of the smaller firms which help to make Bromma something more than "just another international airport." K.T.O.

Afternoon papers being loaded onto a Lodestar belonging to the Airtaco company. These flights leave Bromma daily, just before mid-day.

This Grumman Widgeon, here seen on one of the lakes of the Stockholm archipelago, is operated by the "Dagens Nyheter-Expressen" organization.

LONDON AIRPORT FIDO?

A B.E.A. Appraisal: The Problem of Operating Cost

THE recent test of the Fido equipment at Blackbushe (described in *Flight* last week) has provoked much discussion concerning this bad-weather aid to landing and take-off, used so extensively during the war. Expense of operation is invariably stated to be the prohibitive factor governing its use, although uninformed estimates of the actual running costs have varied considerably. A report recently prepared by B.E.A. provides what we believe to be the most comprehensive investigation yet made into the economics of Fido use from the airline operator's point of view. Although the calculations are made on the basis of B.E.A.'s own operations, the following condensed version of the report will be of interest to most operators, and others, requiring a realistic economic appraisal of the Fido system.

The report, entitled "F.I.D.O. at London Airport. An Assessment of Its Value to B.E.A.," is the result of investigations by a B.E.A. working group comprising representatives from the Corporation's commercial, engineering, movements and flight operations departments, under the chairmanship of Mr. E. L. Killip, operations research and planning manager.

Method Used.—The basis for the group's calculations were B.E.A.'s 1951 statistics showing all cancellations, diversions and delays of over three hours (with or without night-stops). An analysis was made of the actual weather conditions prevailing on these occasions, and from this it was possible to select those irregularities due solely to bad weather in the London area. An estimate was then made of the number of each type of irregularity which would have been avoided had Fido been available, assuming a limiting visibility of 50 yd. The year 1955 appeared to be the earliest date by which Fido could be expected to be in operation at L.A.P., and so the figures were scaled up accordingly, on a route-by-route basis, with the same percentage of irregularity.

Possible financial savings due to the use of Fido were considered under six headings:—

(i) Decreased engineering maintenance costs, due to the more regular flow of aircraft to the maintenance base during bad weather.

(ii) Reduction in fuel reserves, with consequent increased revenue.

(iii) Losses, due to irregularity, which would be obviated: (a) Cancellations (excess of route-by-route losses in revenue over the saving in marginal costs); (b) delays involving night-stops (route-by-route losses in passenger revenue, plus accommodation, meals and transport costs); (c) delays of three hours and over without night-stops (route-by-route losses in passenger revenue plus cost of meals); (d) diversions (costs of passenger transport, extra landings, extra flying hours, extra passenger handling, and accommodation).

(iv) Revenue from additional traffic which might result from a reputation for high regularity in winter.

(v) The effect of improved regularity on the requirements for standby aircraft and crews.

(vi) The comparison of all the above factors with the latest amended estimates available from M.o.S. and M.C.A. of actual Fido cost.

Operational Problems.—The M.C.A. proposals for a Fido installation at London Airport specify a 3,950ft length of burners to be installed on the western approach to No. 5 runway. This distance is calculated so that at a critical height of about 200ft the aircraft should be able to pick up the high-intensity approach lights and make a successful approach. The burners extend for 3,500ft along the runway, and it is estimated that this should be adequate to clear the runway for 1,000 yd from the threshold. Provision for this length of burner line—7,450ft in all—has been made, but any extension would involve concrete-cutting across the intersection of No. 6 runway and a main taxiway.

Although it is clear that in normal circumstances landings and take-offs could be made using this length of cleared runway with a high degree of safety, the report states, further consideration should be given to the acceptability of running into bad visibility at the end of the cleared path after landing, or after an engine failure at the critical speed on take-off or during an accelerate-stop emergency. If this were not acceptable, an increased length of burners would be needed, with a corresponding cost-increase.

In order to maintain the required rate of landings and take-offs, it was essential that the taxying speed of aircraft should not be a limiting factor. The assumption was that the M.C.A. block signalling system for taxying aircraft would have been put into effect and that the block occupancy times were properly matched to the runway capacity. The problem of the automatic extinguishing of the burners should an aircraft run off the runway was being investigated further by the M.o.S. and the M.C.A.

Economic Results.—The investigation into the possible savings due to Fido, from the six aspects mentioned above, had produced the following findings:—

(i) No evidence was found of additional engineering maintenance costs arising from a sudden influx of aircraft which had been delayed by bad weather away from base.

(ii) An initial estimate of the effect on fuel reserves had shown a possible increased revenue of £6,500 per annum. A change in the application of the variable fuel method, however, indicated that the effect of Fido was now likely to be a reduction in the number of occasions when technical stops for refuelling would be required, rather than a reduction in fuel reserves. Revised calculations were continuing, but it appeared that the cost of the excess technical stops would be similar in amount to the previously calculated saving in fuel reserves. A saving of £5,000 per annum had therefore been assumed.

(iii) (a) Cancellations.—Estimated route-by-route losses in passenger and mail revenue when set against the estimated saving in marginal costs showed a net loss (without Fido) of approximately £10,000 per annum. (b) Delays involving night-stops.—Estimated route-by-route losses in passenger revenue plus the cost of hotel accommodation, meals and transport, showed a total loss of approximately £12,600 per annum. (c) Delays of three hours and over without night-stops.—Estimated route-by-route losses in passenger revenue plus the cost of meals showed a total loss of approximately £2,000 per annum. (d) Diversions.—Estimated costs of passenger transport, extra landings, extra passenger handling, extra flying hours, extra meals and accommodation for passengers showed a total loss of approximately £7,150 per annum.

Thus the total costs incurred plus the direct loss in revenue involved amounted to £31,750 per annum.

1951 STATISTICS (extracted totals)

Irregularity	Number Due to London Weather	Number Curable by Fido
Cancellations (outbound) ...	116	65
" (inbound) ...	126	75
Delays with night-stops ...	178	140
Delays of 3 hr or more without night-stops	208	177
Diversions	94	74

1955 ESTIMATES (extracted totals)

Irregularity	Number Curable by Fido	Total Costs
Cancellations	102	£9,917
Delays with night-stops ...	168	£12,585
Delays of 3 hr. or more without night-stops	146	£1,967
Diversions	110	£7,147

(iv) The estimated winter increase in revenue which might result from the improved regularity (assuming 10 per cent increase on domestic services, 1 per cent on international services) was £49,000, comprising £13,000 on domestic routes and £36,000 on international routes.

(v) It was considered that the requirements for standby aircraft were dictated largely by the probability of encountering engineering snags, and that the greater certainty of getting aircraft back to base in difficult weather conditions would not affect this. Similarly, the requirements for standby crews, largely dictated by normal circumstances of sickness, etc., would not be influenced by the operation of Fido.

(vi) The total cost of the Fido installation was now estimated to be of the order of £300,000. The total annual standing charges, including amortization of capital over ten years, electrical power, maintenance, labour, etc., were estimated at £73,000. Assuming that B.E.A. would operate 50 per cent of the total services, *and that all other operators would agree to pay their share*, the B.E.A. contribution would be £36,500.

The Cost of Fido.—A detailed calculation of fuel costs had been carried out by M.o.S. on an apparently logical basis, and the average cost over a year had been assessed at £40 per minute for

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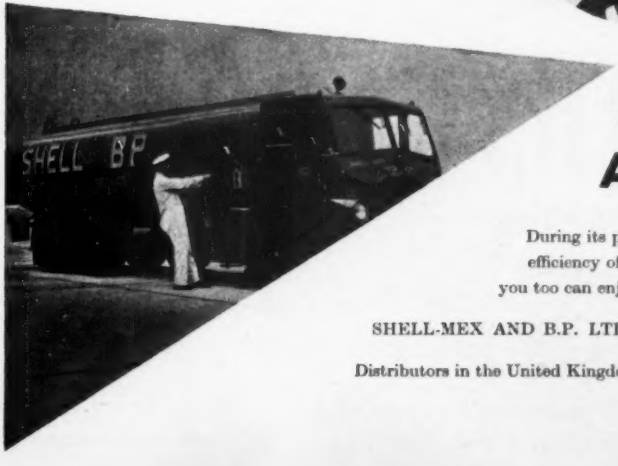
the pilot

John Cunningham, D.S.O. and 2 bars, O.B.E., D.F.C. and bar, joined de Havilland when 18 years old in 1935. A notable career in R.A.F. from 1940 to 1945 included commanding 85 Squadron (Mosquitoes) 1943-44, and Group Captain Ops. at H.Q. 11 Group. Later service over battle areas after D-day, and against flying bombs. Has worked on the Comet as Chief Test Pilot since the first plywood mock-up days, and has flown hundreds of hours in Comets. Says he has "had very good service from Shell and BP".



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LONDON AIRPORT FIDO? . . .

the full installation and £20 per minute for take-offs (because the approach burners were not used during take-off). Assuming an average duration of burn of four minutes, the average landing and take-off costs would be £160 and £80 respectively. When applied to the number of occasions during 1955 when it was estimated that cancellations or excessive delays (avoidable by the use of Fido) would take place, these figures gave a total fuel cost of £64,000.

In addition, the following points had been noted, but quantitative assessments of their importance had proved impossible:—

(a) It was possible that on some occasions aircraft would arrive at London in weather conditions assumed to require the use of Fido which, in fact, would not require this, as the actual runway visual range might often have been greater than the meteorological statistics of visibility used in the calculations. This would probably be offset, however, by the possibility that captains would call for Fido in marginal conditions as an added safety measure.

(b) In the past, extra services had been contemplated, but not operated due to a shortage of aircraft caused by bad weather. It appeared that this factor would add to the benefits to be derived from Fido.

(c) Inability to operate extra services had been caused also by a maintenance backlog due to non-arrival of aircraft at base as planned due to weather.

(d) When the demand for extra services was heavy, it was necessary to provide a margin between the number of extras expected and the number of aircraft estimated to be available, to allow for engineering snags and the possibility of non-arrival of aircraft at base due to weather. The provision of Fido should enable this margin to be reduced.

Conclusions.—If Fido were to be installed at London Airport and B.E.A. were asked to pay one half-share of the full annual charges, the total cost to B.E.A. for a full year would be £100,900. If B.E.A. were asked to bear all the annual charges, this total cost would be £137,000, but in this case the Corporation would be in a position to make a charge to any other operator who decided to use the system, and would thus recoup some of this expenditure. B.E.A. would undoubtedly acquire some of the competing airlines' passengers if the Corporation was the only user of Fido.

The savings and increased revenue to be expected were of the order of £86,000 per annum. Thus, if B.E.A. were to pay half the standing charges, a loss of £14,500 per year was probable on the use of Fido, and if M.C.A. insisted on operators paying all charges, and no other operators were prepared to pay part of the fixed charges, the loss would be £51,000.

There was a possibility that the cost figures might be increased if the proposed installation was shown to be operationally inadequate with regard to the length of runway burners. There were also certain other factors incapable of precise assessment which would increase the benefit to be derived from Fido.

Recent Developments.—Since the report was published, M.C.A. have proposed the use of runway Fido only, which would be less costly while still maintaining a substantial improvement in regularity (the previously calculated improvement in regularity was approximately 2 per cent). It is the opinion of M.C.A. that Fido would not be a safety device at London Airport, as safety is already ensured by operating minima and the use of Manston Fido in emergency. As the purpose would be to improve regularity, M.C.A. claim, the operators should pay for it. Other points under consideration are the B.E.A. assumptions of the length of time during which the aid should be lit, particularly on take-off. The Corporation and M.C.A. are at present continuing their discussions and calculations on Fido economics; it is too early at this stage to forecast the result.

HELICOPTER DESIGN-PROBLEMS

THE second of the autumn-session lectures arranged by the Graduates' and Students' Section of the Royal Aeronautical Society took place on Tuesday, November 18th. The title was *An Introduction to Helicopters*, and the speaker was Mr. J. D. Sibley, B.Sc., who is aerodynamicist in charge of helicopter aerodynamics at the Bristol Aeroplane Co., Ltd., and a graduate member of the society.

Before an audience consisting mainly of the section's members, Mr. Sibley's presentation was well up to the standard of "main" R.Ae.S. lectures. Dealing first with general performance problems, he commented on the induced, rotor profile and parasitic drags which together constitute the helicopter's total drag. It was hoped to reduce the present high value of parasitic drag (40 per cent of total drag at 90 m.p.h. cruising speed) to about 20 per cent of the total by future improvements. Comparing the relative qualities of single-rotor and tandem-rotor machines, the downward interference from the forward rotor on the rear rotor in the tandem case was described, but in hovering flight the tandem was superior.

General operational utility, as well as performance, was a basic criterion. Relative attitude-changes with rotor-tilt were described, together with the effects of collective-pitch variation. Methods of altering the tip-path plane were considered, and this led to a discussion of the problem of stability. The three main types of oscillation (torsional, rotor whirling, and ground resonance) were then fully explained, together with the steps which had been taken at Bristol to reduce the unstable range of rotor r.p.m. A dynamic model had been constructed, to study oscillatory behaviour and to ascertain the degree of damping to be applied to rotor blades and undercarriage.

Two short films were then shown. The first, illustrating a case of ground resonance during the early trials of the Bristol 173, provoked some alarm among the audience and the reassurance from the lecturer that this problem *had* been overcome. The second showed the dynamic model under test : oscillations of the blades relative to the hub, and of the hub itself, could be plainly seen.

The questions and discussion which followed featured most aspects of helicopter performance and design, including safety, engine-failure warning, pitch-change mechanism, the merits of multi-rotor layouts, contra-rotating blades, tip ramjets, noise and pilot fatigue. Only discordant note in a worthwhile discussion was the use of the word "hoverplane" by one questioner—not, it is to be hoped, a member of the Society.

IMPROVED MAMBAS

FIRST axial turboprop in the world, the Armstrong Siddeley Mamba has been continuously improved in order to maintain its position as one of the finest engines in its power class. The most recently announced sub-type is the ASM 5 of 1,460 h.p. s.h.p., in which both power and economy of operation have been improved without increase in the engine's size or weight. It is also cleared to run on a great variety of low-grade fuels, so giving it a significant advantage over less highly developed engines.

Coupled together, two ASM 5s form an ASMD 3, which is to be the standard power plant for the Fairey Gannet. This excellent double unit has a take-off shaft horse power of 2,920 and an effective jet thrust of 535 lb, giving a total of 3,125 e.s.h.p. Under these conditions the fuel consumption is some 274 gal/hr, equivalent to 0.70 lb/hr/e.s.h.p.

FOLLAND ACTIVITY

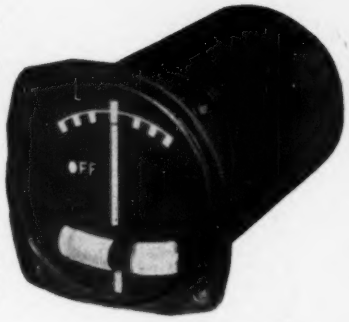
IN a statement issued on the occasion of the 17th annual general meeting of Folland Aircraft, Ltd., Mr. C. L. Hill, the chairman, said that early in the year under review the board decided that the position of the company was too vulnerable, inasmuch as the whole of its effort was engaged on sub-contract work, coupled with a small amount of development work on guided weapons. A most careful study of possibilities led to the conclusion that the staff and facilities available (not to mention Mr. Petter's previous experience) would be most effectively applied to the development of a relatively small military aircraft. It was these considerations which led to the design of the light fighter [referred to in previous issues of *Flight*].

The company's order book, said Mr. Hill, remained very full, and there was an increase of more than a million pounds' worth of work at June 30th over the orders on hand at the corresponding date last year. The great bulk of orders on hand was still from the de Havilland company for components of the Vampire, Venom and Comet. During the year Folland Aircraft had undertaken for de Havillands the difficult and important task of designing and producing a folding version of the Venom wing for fitting to the Sea Venom. Substantial orders for this new development had been received. In addition, the company had obtained an order from the Hawker Aircraft Co., Ltd., for components of the Hunter.

The company's balance-sheet showed a profit for the year (to June 30th) of £173,282, after providing for all charges but before taxation, against a corresponding figure last year of £146,362. Provision for taxation would absorb £110,949 (£87,464 last year), leaving a net profit of £62,333 (£58,898). After quoting these figures, Mr. Hill said, "They convey, more than any words I may utter, the way in which the State is draining the life-blood of industrial companies."

A NEW TURN-AND-SLIP INDICATOR

Magnetic Damping to Provide High-altitude Accuracy



The new Kelvin and Hughes instrument features the "needle-and-ball" type of presentation standardized in all NATO air forces.

RARELY can an aircraft instrument have had so long a period of continuous service as the standard air-driven turn-and-slip indicator, which in one form or another has been in service for a period of 20 years. In recent times, however, there has been a growing tendency to introduce instruments operating from the aircraft D.C. electrical system. Kelvin and Hughes, Ltd., were one of the first manufacturers to introduce turn-and-slip indicators of this type. The Mk 10 instrument was the first of their electrically driven indicators, and many Mk 10s are still in service. Following logical development, the Mk 12 came along, incorporating the same main assemblies but embodying an entirely new D.C. motor which has given excellent service, the instruments being cleared by the Air Registration Board to run 1,500 hours between overhauls.

All these instruments have employed air damping, i.e. damping produced by the movement of a piston within an air-filled cylinder, but it will be readily appreciated that the efficiency of such a system tends to decrease in the rarified air of high altitudes. To overcome this difficulty and at the same time to introduce a number of less evident improvements, Kelvin Hughes have developed an entirely new turn-and-slip indicator embodying magnetic damping. The old dashpot-type assembly has been replaced by a copper drag-cup, which is geared up from the gyro gimbal shaft. Inside the drag cup is mounted a powerful permanent magnet, the lines of force from which pass through the cup to a surrounding ring of soft iron. This arrangement has resulted in almost perfect performance; it provides damping which is a function of the rate of displacement of the mechanism and, in consequence, has greater stability, particularly when the aircraft is pulling out from dives involving high-g conditions. The attendant decrease of friction which has been achieved results in a reduction in wear of moving parts and, even more important, in increased reliability and accuracy. Great accuracy in manufacture is essential, but the device has the advantage of simplicity and reasonably low weight.

A further innovation is the introduction of an unusually long rate-spring, located between burnished pivots of minimum diameter—another method of reducing friction and ensuring accuracy.

Friction has also been reduced—and accuracy thus improved—by the employment of plain spur-gearing between the gimbal and the needle. Another useful feature is the mounting of the needle on a plain shaft, friction-held in a chuck, thus permitting accurate pointer-positioning.

Since the turn-and-slip indicator is a primary instrument on the blind-flying panel every endeavour must be made, in the event of power failure, to keep the instrument "alive" until the last possible moment. To achieve this a new feature has been introduced in the form of an "ON/OFF" warning flag. This shows the word "OFF" on the face of the instrument only when the wheel has dropped below the safe operating speed at which it will give a reliable indication of turning.

Atlantic Pact standardization requirements are responsible for the discarding of the two-needle type of presentation so long familiar to the R.A.F. and British users. However, most of those acquainted with the "American" presentation like it, and no trouble should result from its introduction.

The design of the case incorporates magnetic screening so that interference is reduced to give a deviation of less than 1 deg on a compass mounted 12in distant, so complying with Ministry of Supply requirements without incurring weight penalty. In addition, the instrument complies with the M.o.S. specification covering operation under tropical conditions.

Brush wear and commutator problems necessarily have to be carefully considered in the design of a successful D.C. electric turn-and-slip instrument, particularly when manufacturers are continually endeavouring to extend the life hours of the equipment. Although the new turn-and-slip indicator will in many cases be fitted in pressurized aircraft the rapid brush-wear associated with high altitude work could not be ignored. In the new instrument careful armature and brush-gear design has reduced the wear to that met in low-altitude practice provided the instrument is located in the pressure cabin—as patently it must be.

The new instrument has been developed by Kelvin and Hughes, Ltd., Barkingside, Essex. It has full Ministry of Supply approval and quantity orders have been received from the R.A.F. It is entering production for R.A.F. needs and is also likely to find many civil and foreign military applications in the not-too-distant future.

INDOOR RUNWAY

THE characteristically elaborate nature of much American research—with no expense spared—is apparent in a series of tests lately conducted at the C.A.A. Technical Development and Evaluation Centre at Indianapolis to investigate the distribution of wheel loads on runway surfaces and—more specifically—on the "hard-core" (rubble, etc.) which forms the foundation of such surfaces. The tests are reported to have been of particular value in testing asphalt surfaces, which, by their "flexible" nature, tend to localize loads over a comparatively small area of the foundation material.

The test-rig, or pit, used at Indianapolis consists basically of a "mattress" of no fewer than 3,600 spring plungers, each terminating in a 2in-square steel plate. The springs are accurately calibrated, so that their individual depressions (the values of which can be measured in a recording-pit below the rig) give a picture of the load at any particular point on the test area.

Over these spring-plates a sheet of fabric is stretched and the hard-core is then laid upon the fabric. (No information is available in the report which has reached us, as to the degree to which, if at all, this hard-core is compacted.) Finally, the asphalt or other test surface is applied.

Above the surface is a pair of hydraulic jacks carrying an axle on which can be mounted any required type of aircraft wheel and tyre, and so arranged that extension of the jacks presses the tyre into contact with the surface. It is said that the jacks can exert a pressure of 250,000 lb.; presumably, also, they can be operated in such a manner as to simulate a bounce.

The test-pit. Some of the 3,600 plates are visible on the left.

Avro Vulcan...World's First Delta Bomber

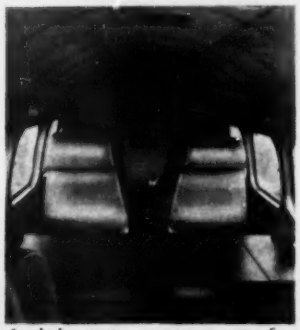
Universally acclaimed as the outstanding aircraft of the year, the Avro Vulcan, world's first Delta bomber, brilliantly fulfils the immense promise of the Delta Wing Planform. A triumph alike of British research and aeronautical engineering, it is to go into immediate production for the R.A.F.

A. V. Roe & Co. Limited / *Manchester.*

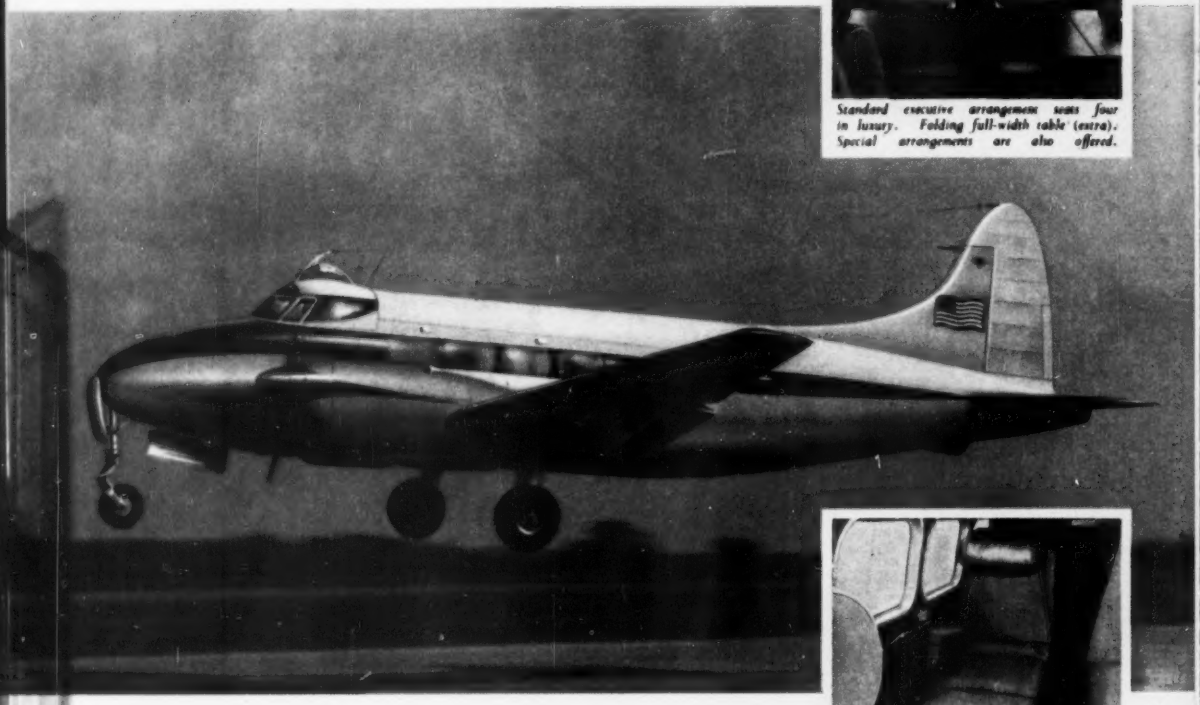
MEMBER OF THE HAWKER SIDDELEY GROUP / PIONEER...AND WORLD LEADER IN AVIATION

The DOVE

For the executive— an airliner in miniature



Standard executive arrangement seats four in luxury. Folding full-width table (extra). Special arrangements are also offered.



Facing pairs of adjustable armchairs are quickly convertible into softly upholstered couches.

Elegance with efficiency and economy

In extensive service in more than 40 countries including the U.S.A.

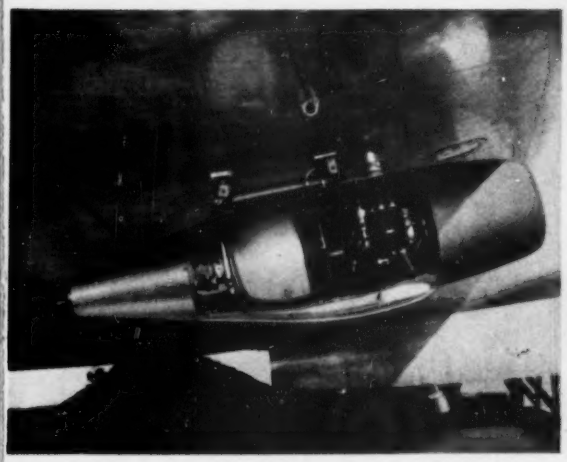
Range 1,500 statute miles at economical cruising speed, making 1,100-mile stages a practical operation.

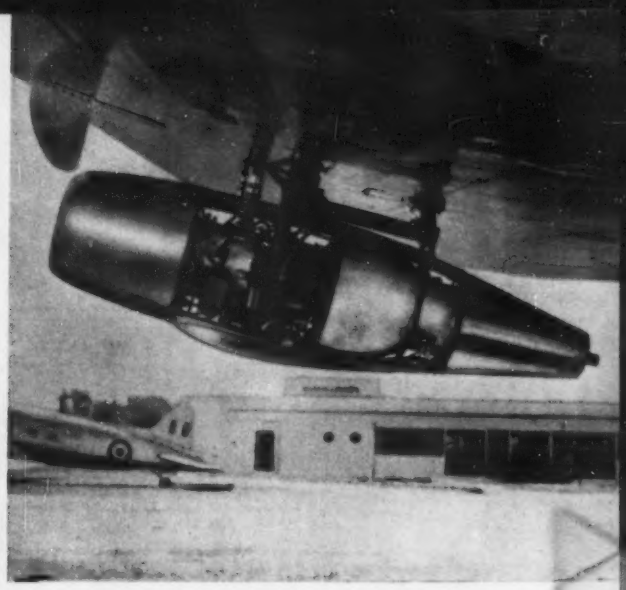
Fifth seat for occasional use is located forward.

DE HAVILLAND

Builders of the Comet, the world's first jet airliner

Factories in England, North America, and Australasia
Distribution and Servicing organisation throughout the free world





Turboméca Palas lightweight turbojet fitted beneath the starboard wing of a Curtiss C-46 Commando. Cowlings have been removed in the views above to show the casing of the centrifugal compressor, and the annular combustion chamber.

JET BOOST FOR TRANSPORTS

Small Turbojets as Take-off Aids: Arguments for the Turboméca Palas

SINGLE-ENGINED performance, rather than airframe strength, is the factor which most often controls the permitted take-off weight of twin-engined transport aircraft. In such cases the payload of an aircraft—and, consequently, its value as a transport vehicle—can be greatly improved by the incorporation of a security device offering temporary increase of power under certain critical conditions, notably at take-off. Two possible ways of achieving this purpose are water-methanol injection, which enjoys fairly wide use in civil aviation and is applicable to both piston engines and gas turbines, and assistance at take-off by external rockets (this method is less popular in the commercial world on the grounds that it is both expensive and liable to alarm passengers). A third method, developed in France but attracting the interest of operators in many parts of the world, is the attachment of one or more lightweight turbojets for use both at take-off and in the event of engine failure in cruising flight.

During the past year, considerable experience has been accumulated in this direction, mainly with the Turboméca Palas, which has a single-stage centrifugal compressor, annular combustion chamber and single-stage turbine, and delivers a static thrust of 350 lb. The Fouga concern, which has produced a series of successful Turboméca-powered light aircraft, originally developed the Palas booster unit, a self contained nacelle weighing 210 lb with a maximum diameter of 18in. Exclusive sales rights for the booster unit were obtained by the S.N.C.A.S.O. organization (U.K. concessionaires are Aerocontacts, Ltd., Gatwick), which has been responsible for its application to three types of aircraft—the DC-3, C-46 Commando and S.O. 30P Bretagne.

The DC-3 is equipped with a single Palas beneath the centre section, and the Commando and Bretagne each carry two booster units beneath the wings. In each case the turbojets use petrol from the normal tanks supplying the piston engines. The Brazilian airline V.A.R.I.G. was, incidentally, the first operator to adopt the Palas; fitted with two Palas booster units by an Italian company, the Brazilian Commando began flight trials under official Italian supervision last September.

The S.O. company has published figures to illustrate the improvements in performance achieved by equipping a DC-3 (two P. and W.R-1830 radials) with one Palas auxiliary jet unit. With two piston engines operative, service ceiling is unchanged; with one airscrew feathered, ceiling is raised from 7,000 to 9,500ft. At a weight of 28,000 lb, the thrust provided by the Palas reduces the distance taken to reach safety speed by between 5 and 10 per cent. The main purpose of the tests, however, was to find the increased weight at which the jet-equipped DC-3 could equal the take-off distance and climbing-speed of the standard DC-3; thus, with a runway 4,760ft in length and 4,000ft above sea-level, the permitted a.u.w. increases from 24,383 lb to 27,227 lb. In flight, the jet nacelle is responsible for a small amount of drag, reducing cruising speed by less than 2 per cent, and causing an increase in fuel consumed of only 22 lb over a 310-mile stage.

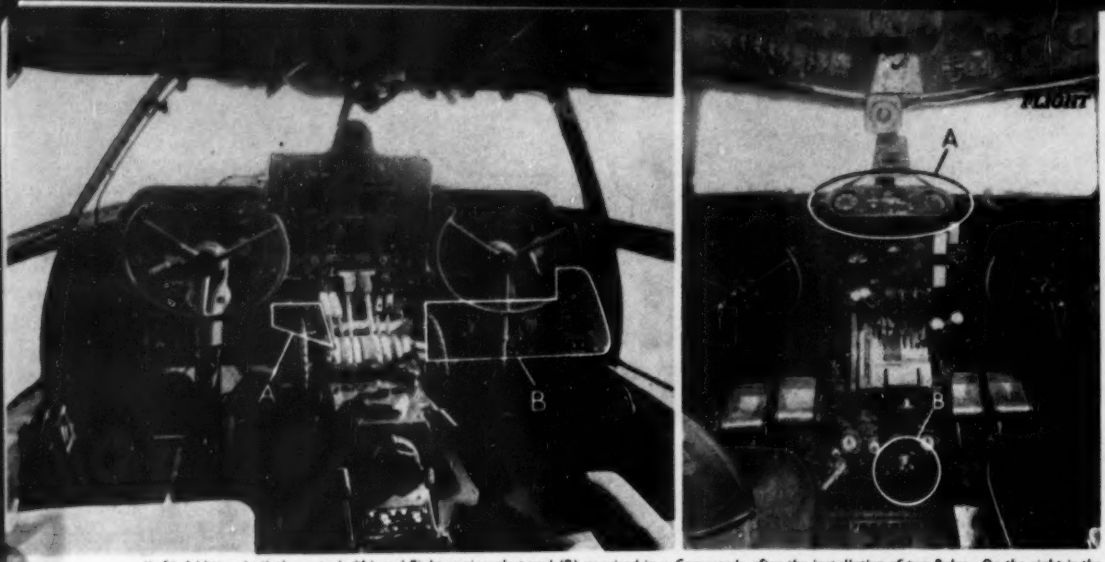
Certain operators who use DC-3s only over very short stages do not require the jet boost, as their take-off weight is limited by landing weight. However, use of the Palas as an in-flight power-reserve is also suggested by S.N.C.A.S.O. Admittedly, fuel consumption is increased and speed is reduced if the jet is brought in during cruising flight to replace an inoperative piston engine, but (S.N.C.A.S.O. claim) the extra fuel can be drawn from the stand-off reserve, since the aircraft would invariably be given landing priority on arrival.

French official approval has been granted for operation (under standard temperature conditions) of the Palas-equipped DC-3 at a gross weight of 28,790—an improvement of some 1,910 lb, corresponding to an increase in payload of 1,540 lb.

According to S.N.C.A.S.O., the increase in revenue earned by a DC-3, following the installation of a Palas, would be 20m francs (approximately £20,000). This figure assumes an average increase of five passengers per flight, at five francs per passenger/km, an average block speed of 180 km/hr (112 m.p.h.) and annual utilization of 1,500 hr. Corresponding annual expenditure would be 5.6m francs (£5,600), accounted for as follows :—

	Francs
Fuel consumption of the jet at each take-off, assuming 750 take-offs per year and 12 litres of fuel per take-off	300,000
Total additional fuel consumption due to the drag of the jet unit	200,000
Maintenance	300,000
Spare parts	800,000
Amortization of the jet unit and a complete stock of spares within three years (assuming the most pessimistic case, i.e., a single aircraft equipped with the Palas). Per year ...	4,000,000
Total	5,600,000

The time taken to equip a DC-3 with a Palas auxiliary jet unit is about a week, so the conversion could well be carried out during overhaul. The overhaul life of the jet unit itself is 500 hours, and its maintenance requirements are negligible. Exhaust gases from the Palas cool rapidly, and the unit can be installed close to the



(Left) Additional pilot's controls (A) and flight engineer's panel (B) required in a Commando after the installation of two Palas. On the right is the cockpit of Dakota F-BFGC, equipped with one Palas, showing the "jet panel" (A) and fuel control (B) for the third engine—mounted, in this case, beneath the centre-section. The cost of modifying a Dakota, excluding man-hours, is quoted as £5,600.

JET BOOST FOR TRANSPORTS . . .

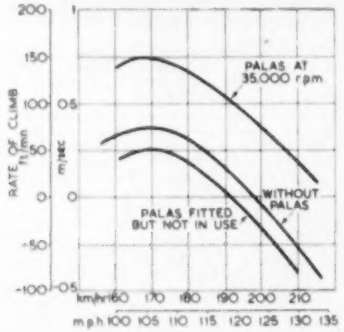
wings or fuselage without risk. The noise it produces is drowned by that of the piston engines, S.N.C.A.S.O. claim, so that passengers are unlikely to be aware of it.

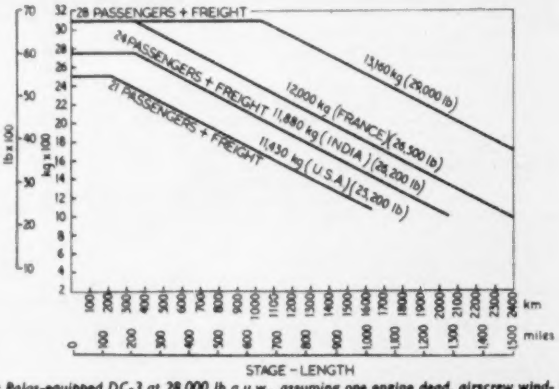
Next to the DC-3, the C-46 Commando is described as the aircraft best capable of utilizing the Palas. In this case two jet units (one under each wing outboard of the engines) are required to give a useful increase in performance. Following a series of accidents, and subsequent investigation of the C-46's single-engined performance characteristics, the all-up weight of the aircraft was reduced from 48,000 to 45,000 lb and a further reduction of 1,000 lb is thought likely. With two Palas, it is claimed, the aircraft can operate safely at its original all-up weight. After deducting the weight of the jet installations, the payload would thus be improved by some 3,500 lb, assuming identical runway-lengths and other take-off conditions. Full figures for the jet-equipped Commando are not available, but during recent trials at a take-off weight of 45,000 lb, the distance taken to reach safety speed was reduced by 320ft and the climbing speed, with one piston engine feathered and two jets at full power, corresponded to 260ft/min at 3,000ft (an increase of 120ft/min on the climbing speed with one piston engine only).

Some figures are also available for the S.O. 30 Bretagne (two P. and W.R-2800 engines of 2,000 h.p.) when equipped with two Palas, likewise fitted under the wings, at a take-off weight of 45,300 lb. Using the jet units from the beginning of the take-off run, the distance required to clear a 35ft obstacle with one piston engine failing at the critical point is reduced from 8,930ft to 5,360ft. Climbing speed with one piston engine feathered is increased by some 120ft/min. The drag produced by the two jet fairings beneath the wings reduces cruising speed by approximately 2 per cent.

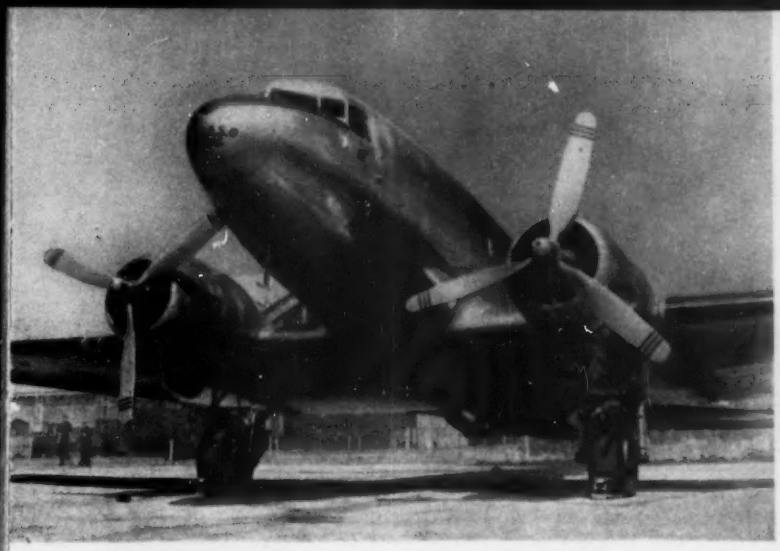
All things being equal, the Palas-equipped Bretagne will take-off with about 2,530 lb more payload, than the non-jet version, allowance having been made for the extra weight (550 lb) of the boost units. The fuel weight, including reserves, required by the jet version for making a flight of 930 miles, having taken off at 45,300 lb, is 5,130 lb—3.5 per cent or 175 lb more fuel than is required by the non-jet Bretagne. The resulting decrease in radius of action is, therefore, approximately 50 miles.

Auxiliary jet units are also receiving study in America, where the Flying Tiger Line has equipped one of its Commando freighters with a Turboméca Marbore (880 lb thrust) in a self-contained pod, weighing 461 lb, beneath the centre-section. The results, it is reported, have encouraged the company to suspend an investigation into the advantages of using water-methanol injection to improve the Commando's take-off performance.





(Left) The top curve illustrates the improved rate of climb of a Palas-equipped DC-3 at 28,000 lb a.u.w., assuming one engine dead, airscrew windmilling and flaps fully up; the good engine is producing 1,212 h.p. and the 350 lb.-thrust Palas is running at 35,000 r.p.m. As the lower curves indicate, the Palas nacelle-drag causes a slight drop in performance when the jet is inoperative. (Right) Payload v. stage-length performance of a Palas-equipped Dakota taking off at 29,000 lb; comparative performances shown are those of DC-3s at maximum authorized take-off weights for three countries (weight authorized in this country is 28,000 lb.; a comparison would thus be less favourable). Assumptions: freight, 600 kg (1,320 lb.); passenger-weight, 90 kg (200 lb); cruising power of piston engine, 592 b.h.p.; cruising speed, 178 m.p.h.; headwind, 10 m.p.h.; specific consumption, 0.5 lb/b.h.p./lb; fuel reserve of 750 lb for 200-mile diversion and 45-minute stand-off.



The insignificant size of the Palas auxiliary when seen beneath a Dakota (left, and, at closer quarters, immediately below) belies the useful increase in take-off performance provided by this 350 lb-thrust turbojet. In America, the Flying Tiger Line is experimenting with a Turbomeca Marbore of 880 lb thrust, similarly installed beneath the fuselage of a Curtiss Commando. The French method of improving the Commando's performance, however, is to fit two Palas beneath the mainplanes—as illustrated at the foot of the page.

TURBOMÉCA PALAS A.J.U. (AUXILIARY JET UNIT)

Principal Data:—

Maximum static thrust	160 kg (350 lb)
Total length	1.755 m (69in)
Maximum width	0.45 m (18in)
Gross weight	95 kg (210 lb)

Compressor.—Single-stage centrifugal type; theoretical compression ratio at sea level, 4 : 1; delivery at sea level, 3.1 kg/sec (6.85 lb/sec).

Combustion chamber.—Annular; centrifugal injection from rotating disc.

Turbine.—Single-stage axial.

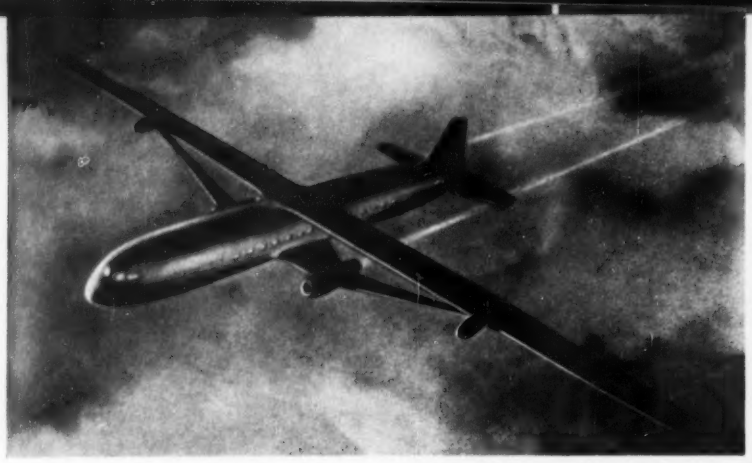
Nozzle.—Length, 450 mm (18in); jet velocity, 470 m/sec (1,550 ft/sec).

Fuel.—Petrol or kerosine.

Lubricant.—(Mineral oil, S.A.E. 20-20 W); normal pressure, 3 kg/cm² (42.6 lb/sq in); min. pressure, 1 kg/cm² (14.2 lb/sq in); max. pressure, 5 kg/cm² (71lb/sq in); normal temperature, 40 deg C; max. temperature, 70 deg C.

Ancillaries.—(1) Fuel pump delivery 360 litres/hr (84 Imp. gal/hr) at 3.2 kg/sq cm (45.4 lb/sq in). (2) Oil pump unit for lubrication and oil recuperation of the bearings and relay box. (3) Gearbox for tachometer, generator and starter. (4) 24V, 350 amp electric starter. (5) Ignition coil and two plugs. (6) Independent oil circuit, including an annular 7-litre (1.55 Imp. gal) tank, inclusive of 4 litres foaming-space. (7) Electric motor for ensuring the opening of the intake regulator in 30 sec and its closing in 12 sec.

Controls and Instrumentation.—All-electric. Three quick-disconnect plugs for (a) starting up and ignition, (b) tachometer, (c) all other purposes. Three-needle indicator for exhaust-nozzle temperature; oil temperature and oil pressure; intake-regulator position indicator; tachometer.



The 80-seater HD-45 project, with outboard turbojets and wing-mounted fuel tanks.

M. Hurel, designer of the "HD" series of aircraft.

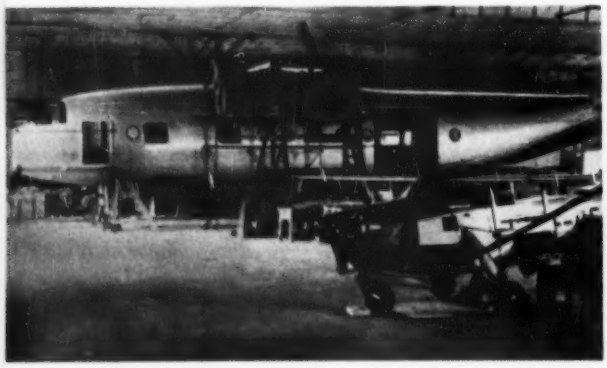
HUREL DUBOIS TRANSPORTS

Progress with the HD-31 and 32 : The HD-45 Jet Project

CONSIDERABLE attention has been given in French aviation circles to the projects put forward for the Government's contest for medium-range transport aircraft, sponsored by the Secrétariat Général de l'Aviation Civile et Commerciale, and for which well over 500,000,000 francs have been allocated. The main nationalized concerns and three private companies—Bréguet, Dassault and Hurel Dubois—have submitted very unusual and advanced designs with various combinations of turboprops, and axial-flow, "double-flow" and auxiliary turbojets. These are intended to meet the requirements of the Mediterranean and European services of Air France, and of such independent lines as Union Aéromaritime de Transport, Compagnie des Transports Aériens Intercontinentaux and Société Aigle Azur, operating in the French Union.

One of the designs which aroused most interest was the HD-45, proposed by Avions Hurel Dubois S.A., and incorporating their now well-known combination of high-aspect-ratio wing and lift struts. Initially considered were two layouts, HD-40 and 41, incorporating swept wings and having twin axial-flow turbojets and four "double-flow" units respectively, but these were superseded by the 70/80-seater HD-45, with two 9,260 lb thrust axials mounted in the lift struts. The HD-45 design found favour with the authorities, though it is understood that an order for a prototype will not be given until flight tests have been carried out with the piston-engined HD-31 now under construction.

The prototype HD-31 under construction at the Hurel Dubois works at Meudon-Villacoublay earlier this year. In the foreground is the HD-10.



It may be recalled that after the war M. Hurel, the designer of the HD-45, undertook lengthy research into the advantages of the high-aspect-ratio wing which, he claimed, would reduce induced drag. By the use of lift-struts increased aspect ratio could be obtained without the penalty of greater airframe weight. Thus, machines built on this principle, he argued, could have a performance comparable with conventional types having a much smaller payload. His ideas were first put to the test on the little single-seater HD-10, with a span of 39ft 4in, and an aspect ratio of 32.5. This was built at the P. Levasseur factory and its trials were so successful that the French Government ordered two prototypes of a 36-passenger freighter, the HD-31, powered by two Wright R-1300-C7-BA1 engines of 800 h.p. and having a wing of 20.2 aspect ratio.

Having taken over a derelict and dilapidated hangar at Meudon-Villacoublay, Hurel Dubois converted it, in a space of months, into a light and airy factory where work was immediately put in hand on the HD-31. The machine now has its undercarriage fitted, the outer wing sections are complete, and a first flight appears possible before the year's end.

A higher powered prototype—the HD-32—with 1,200 h.p. Pratt and Whitney R-1830-92 Twin Wasps is also the subject of a Government order. It is learned that the second HD-31, now taking shape at Meudon-Villacoublay, is also to have Twin Wasps and will therefore be up to HD-32 standard. Forty-two passengers, or 11,025 lb of payload, will be carried by the HD-32 over stages of 620 miles, using Class "C" airfields, and it is claimed that operating costs will be about 30 per cent lower than for comparable aircraft. The engine installation is almost identical with—in fact, interchangeable with—that of the Consolidated Catalina.' Latest figures for the HD-32 are :—

Span, 147.6ft; length, 72.1ft; height, 22.6ft; wing area, 1,076.4 sq ft; passenger cabin length, 32.8ft; gross weight (passengers), 36,382 lb, (freight), 38,257 lb; maximum speed at sea level, 186 m.p.h.; economical cruising at sea level, 155 m.p.h.; economical cruising at 9,800ft, 167 m.p.h.; minimum speed, 66 m.p.h.; take-off speed, 81 m.p.h.; distance to clear 50ft, 656 yd (with one engine inoperative, 1,230 yd); landing distance over 50ft, 410 yd; service ceiling, 16,400ft; maximum range with 8,820 lb freight, 1,240 miles, with 6,615 lb fuel and oil.

Later versions of the HD-32 have been investigated, with four Armstrong Siddeley ASM3 turboprops or two Double Mambas.

Advanced project work is now going forward with the HD-45 twin-jet design capable of transporting 80 passengers at 452 m.p.h. for more than 1,550 miles. Many changes from the HD-31 are apparent in the drawings of the new type. The fuselage is more streamlined, the twin fins have been replaced by a single unit, and the undercarriage has been made retractable. Wing area has been increased, and the aspect ratio reduced to 18.4. Span is the same as for the HD-32 (147.6ft), but the length has been increased to 98.4ft and the height to 26.2ft. The fuselage, cylindrical in shape, has a diameter of 10.9ft.

The power units will probably be either late-mark Avons such as the RA.16s to be fitted on the Comet 3, or a development of the SNECMA Atar 101. They will be underslung at the outer ends of the horizontal portion of the lift struts. The four-wheel main undercarriage units will have a track of 15.7ft and retract inwards

The Bristol 173 Helicopter is fitted with two Alvis Leonides Engines

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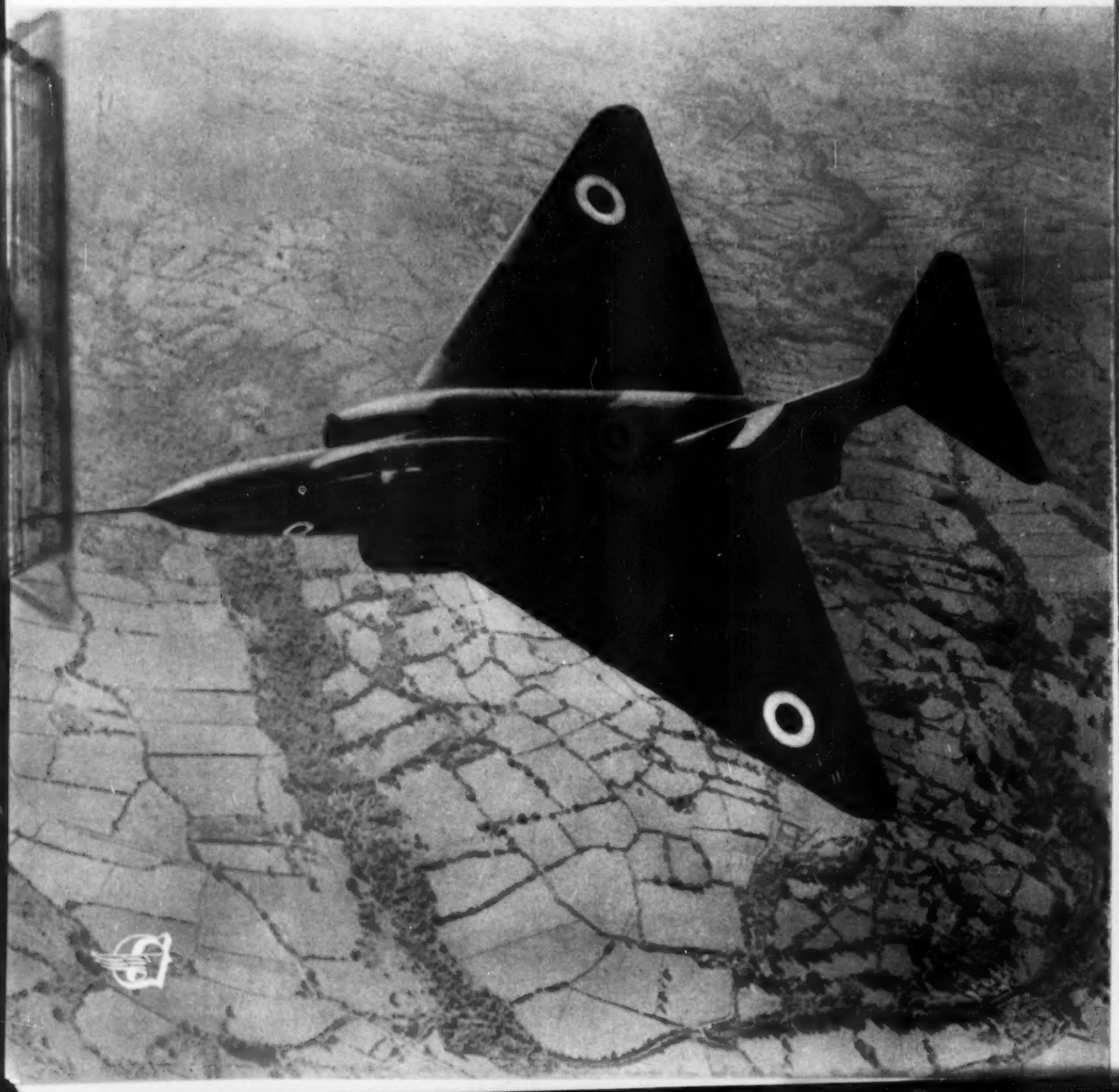


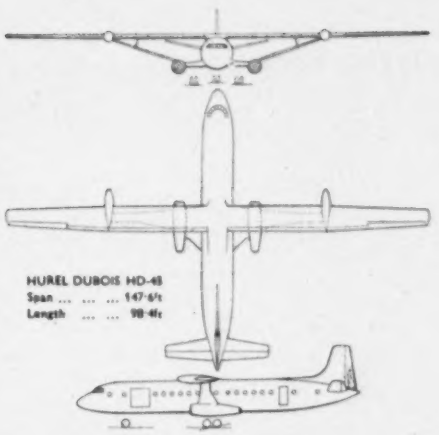
HUREL DUBOIS TRANSPORTS . . .

into the underside of the fuselage, the twin-wheel nose assembly retracting under the forward freight door position. Single bracing struts are specified instead of the four on the HD-32. At the joint of the lift struts and the mainplane, some 39ft from the fuselage centre-line, wing fuel nacelles, similar to those on the Comet Series 3, will be mounted. Estimated data are (performance for a stage of 1,550 miles) :—

Wing area, 1,184 sq ft; payload (80 passengers plus baggage, and 2,205 lb freight) 17,640 lb; fuel, 28,665 lb; gross weight, 90,405 lb; take-off speed, 124 m.p.h.; take-off distance over 36ft, 1,422 yd; take-off distance over 36ft on one engine, 1,915 yd; landing speed, 133 m.p.h.; landing distance over 50ft, 1,313 yd; cruising speed, 452 m.p.h.; service ceiling, 32,800ft.

On a stage of 1,860 miles, the all-up weight rises to 94,815 lb due to the increased fuel carried. The payload, however, remains the same.

Many readers of *Flight* will remember the visit of the HD-10 to the Royal Aeronautical Society Garden Party in May, 1950, when we reported: "Maurice Hurel displayed his Hurel Dubois in a fashion calculated to allay the fears that its fantastically slim wing aroused in beholders". This little machine, incidentally, achieves a speed of about 160 m.p.h. on the 75 h.p. of a Praga D four-cylinder engine.



STAFFING PROBLEMS

Sir Roy Fedden's Views: Further Extracts from the R. K. Pierson Memorial Lecture

THE author of the first R. K. Pierson Memorial Lecture, Sir Roy Fedden, divided his Paper (delivered to the R. Ae. S. at Weybridge) into two distinct sections. The first, which dealt with those Vickers aircraft for which the late Rex Pierson was responsible, was summarized last week, and a brief reference was also made to the second section. Sir Roy Fedden's appointment with NATO places him in a unique position to study conditions in the aircraft industries of Western European countries and America as well as our own, while his interest in technical training matters is well known. We therefore print more fully here the second portion of his lecture, which bears on this subject. We may first remark that reference was made in last week's leading article to the keen interest aroused by previous contributions on the subject of training for the aircraft industry and the opportunities and conditions offered. The views of a number of readers have also been expressed in letters.

Sir Roy Fedden led up to his subject by mentioning a note written by Rex Pierson shortly before his death. In it he placed staffing problems first, "and," said Sir Roy, "although he had come up the hard way himself and believed that there was still plenty of scope for the keen man along that same road, he believed that we could do with more men in our future design teams with good academic background as well as practical, technical and shop experience."

Sir Roy continued: "We lead the world today in aircraft because of the combined good qualities of very few people such as R. K. Pierson, and because of their innate sound commonsense and wisdom to do the right thing at the right time. Wisdom is the greatest of these gifts and is the vision with which knowledge is used, that intangible thing, a man's creative genius, which enables him to tackle each problem as it comes up in the right relation to the others, and from the correct standpoint. These qualities, which are a special British prerogative, provide the answer to the position we are in today in aviation and for no other reason.

"This does not mean, however, that this very small band, upon whom so much had depended, would not have been even better, if they could have been given a fuller background in their formative years, and that as each generation of leaders arises this need will grow greater."

Sir Roy Fedden went on to say: "I have recently been living in France studying the aircraft designs and requirements of continental Europe in company with certain American technicians, and when I returned to England I took the opportunity of visiting the S.B.A.C. Farnborough Show. We have certainly made remarkable progress during the last six years, in spite of great difficulties here at home since the war. British aviation is to be congratulated, and is in an enviable position.

"Seldom, however, has there been a greater challenge of the unknown in all branches of aviation. The next six years will produce greater advances, in my view, than the last, and this must inevitably lead on to higher and higher accomplishment, a yet greater increase in the tempo of aeronautical development, and a heavier burden on the aircraft designer and his team.

"This being so, I do not see around me any evidence which could entitle anyone to be smug or satisfied about our position. . . . I am not criticizing the efforts of our designers and I will not attempt to outline what the long-term development plan of the future should be. I am certain we cannot afford in this country the very expensive research equipment laid down in other parts of the world for new aircraft development—although, as I have already indicated, there is some, which, I believe, it is important for us to have as quickly as possible.

"But if we are going to maintain this lead, then of one thing I am certain, and that is, we have got to lay down longer-range investments in the creation of the right brains, sufficient people with the best possible academic and practical background, having good personal qualities and leadership, possessing aggressive, restless minds, to head up and strengthen aircraft and engineering design-teams of tomorrow.

"It is the realistic impartation of all three sides of a man's professional make-up, the blending of the fundamental sciences and the practical engineering and shop experience, together with the personal and leadership qualities, that will endow our future design leaders with the necessary power and wisdom to tackle the enormous jobs they have ahead of them, and we must also provide them with sufficient similarly equipped lieutenants."

Speaking from long experience, the lecturer continued: "It is a long and arduous task to constitute a good design-team, and I was for ever searching for good men and when I had found one, there were always several jobs waiting for him. It is surprising, also, how soon such a team can be dissipated, and I think it would be regrettable if we lost too many trained aeronautical technicians abroad at the present time until our reserves are stronger. Of recent years I have had the good fortune of being able to stand back and appraise the constitution and make-up of design teams both at home and abroad and it is most enlightening to see how individual teams are handled, how the whole tone is taken usually from one or two people, and how the success of the entire organization is dependent on a few.

"If we are to maintain our lead there is an urgent necessity to tackle this problem promptly, laying greater emphasis on quality rather than quantity, but, nevertheless, I suggest we want to build up a reasonable reserve to meet the calls of the Dominions. Incidentally, this might help our present production problems; I have come back from the Continent rather appalled at the present position and convinced that to keep a NATO Air Force at anything like an efficient pitch in time of emergency, we must give a great deal more attention to the growing complexity, the adequate maintenance and the standardization of military aircraft. Further, quite a number of our present production difficulties can, I believe, be laid at the door of the technical teams in the way their designs are broken down for production, and their manufacturing data passed over to the production factories."

Sir Roy Fedden went on to suggest that the problems he had mentioned were not being dealt with, mainly because the people most vitally interested were already working to their limit. He then said: "On principle, I do not like quoting outside authorities' figures, but I feel I must do so in an endeavour to bring home to you the true position. Last April the Advisory Council on Scientific Policy to the Ministry of Defence devoted the whole of their annual report to the Lord President of the Council on the needs of scientific and technological manpower. It will suffice if I make the following comments on it:

"(1) There is a pressing need to increase the number of all classes of mechanical engineers and scientists, adequately trained and possessing high qualities of leadership and personality.

"(2) This shortage is not temporary, but is likely to go on for years and so long as we remain an important power requiring large engineering facilities.

"(3) Engineering is not attracting as many boys of outstanding ability in England today as is necessary, and could otherwise be attracted, were it not for certain counteracting, out-of-date influences.

"(4) Many students with the possible ability to reach these standards leave school too early and should remain until they are nearly 18.

"(5) There are not enough good teachers.

"(6) A further expansion of the facilities for higher engineering and scientific training is necessary.

"This is a serious and important report produced by eminent people after many months of investigation," said Sir Roy. "It includes not only the needs of qualified aircraft engineers, but comprises the requirements of all Britain for people trained in fundamental science and engineering to the level of a university degree or equivalent qualification.

"The report was presented to Parliament by command of Her Majesty

STAFFING PROBLEMS . . .

last May and, apart from a debate in the House of Lords on it in June last, I am not aware that anything has yet been done about it. Ministers are glad enough to talk about the export value of British aircraft in the years to come, but this cannot be of lasting value if they do not see that we have the wherewithal to maintain our lead in technically-trained men and adequate research equipment."

Information recently sent to the lecturer from America by his friend Mr. T. P. Wright (vice-president of Cornell University and an Honorary Fellow of the Society) shed another light on this question. The information consisted of the June, 1952, Report of the Guggenheim School of Aeronautics of New York; the latest Report of the N.A.C.A. Design Committee set up to investigate the present capacity of qualified universities in the States to train high-grade aircraft personnel and to give an expert opinion on the technical characteristics of equipment at these universities at the present time and how much it is being used for training; and some facts and figures on Cornell University Chair of Aeronautics. Broadly speaking, the conclusions Sir Roy had drawn were:—

(1) A full appreciation of the urgent need for additional adequately-trained aircraft engineers in America.
(2) An appreciation of the qualities required for a highly-trained aircraft designer.
(3) There was no need to worry about any downward trends for aircraft engineers in future.
(4) The young man contemplating the technical side of aircraft engineering was in a happy position. Technical progress was rapid and each time engineering science opened the door to a new era of achievement.
(5) Prospects and pay were good.
(6) University facilities in U.S.A. were sufficient for all the aircraft students required, but were not being fully used.
(7) Good teachers were in short supply and were tending to go into the aircraft industry.
(8) Independently from numbers, not sufficient of the best class of student were being attracted to aircraft engineering.

Sir Roy commented: "Apart from the fact the British report deals broadly with engineers and scientists for senior posts in all branches of industry and the American specifically for aeronautical engineers, it is remarkable how closely the broad patterns of the reports follow each other.

"The Americans—who, I should think, have made a realistic survey—say they just cannot get enough of the best brains to fill the aircraft technical pipelins, in spite of the fact that it is considered that the standards of academic training and equipment are good enough, and the pay and prospects when a man is fully qualified are excellent. One of the main reasons for this is stated to be that the glamour has gone out of aeronautics, which is now an accepted ordinary part of American life, and the best brains are seeking electronics and nuclear energy.

"This is a startling statement, especially as it is understood there is not in America any of the inferiority complex about engineering as a profession that we still suffer from here. I do not think we have ever had much of a glamorous period in aviation engineering in this country. I know things are much better now, but 40 years ago, if your son went into engineering, it was one of those things you did not talk about."

Next, Sir Roy referred to Lord Hives's recent address to Nottingham University. He had noted with considerable interest that Lord Hives came out with a forthright statement that his firm has always been controlled by engineers. "It has been an unfortunate thing," said Sir Roy, "that engineers have not held their place on the administrative side of the British aircraft industry in the same way that has always been the case in America and Germany. Today, in my view, the businessman and the accountant still hold too much sway in this country, and Rolls-Royce are a good example of the opposite approach of balanced management. But before British engineers can take their proper position in the top flights of industry two things have to be changed.

"Firstly, the engineers must show by their balanced training and breadth of outlook that they are worthy to take the administrative posts—which the last generation, with notable exceptions, have not been, because they left school too early, and had to work terribly hard in their younger formative years; and, secondly, we must shake off the shackles from the universities, and other seats of learning, a problem which America and the Continent have not to grapple with—that it is not 'quite out of the top drawer' to become an engineer.

"Supposing our pipeline of first-class technical people is adequately filled, how does the industry stand then ?" asked Sir Roy. "I suggest they on their part have certain things to do also. Most firms have schools at the apprentice level, but these vary and there is still room for improvement especially at the level of what is known on the Continent as the chartered design or shop engineer. But very few have a proper nursery to bring on, finish off, and inculcate with the prestige and hall-mark of the firm, the cream of their own people and the basically well-trained selected students who have come from the universities and other seats of learning.

"It is not long ago that there were no apprenticeship schools and youngsters had to fend for themselves and pick up what they could in the shops. It is even more important that there should not be a haphazard introduction into key posts in industry of specially trained and qualified men without the final grooming period.

As mentioned last week, Sir Roy concluded with a list of suggestions (page 652) and the following statement:—

"It must be appreciated—as it is in countries like Switzerland, Sweden and Germany—that a fully qualified technological engineer is a profession requiring as long and faithful study as certain of the older and more entrenched professions, and that he must be paid a living wage while undergoing the finishing-off process."

SCIENTIFIC TRAINING AT CAMBRIDGE

SOME readers will already have seen an article, *Engineer Into Technologist*, by Professor J. F. Baker, O.B.E., M.A., Sc.D. (Head of the Department of Engineering at Cambridge University), which appeared recently in the *Daily Telegraph*. It was written on the occasion of the opening, by the Duke of Edinburgh, of the new laboratory and lecture-room block for the Department. Extracts are reprinted here because much of the article is of considerable interest to those concerned with aviation and may be regarded as complementary to other recent features in *Flight*—in particular the summary of a lecture by Lord Hives. Professor Baker wrote :—

"It will surprise many who think of Cambridge as the home of mathematicians, pure scientists and humanists, to be told that Engineering is the largest department in the University, with a population of 661 undergraduates, 47 post-graduate students and other research workers, a teaching staff of 53 and an assistant staff of 116. Almost one in ten of the students now at Cambridge is an engineer, a proportion which has been roughly maintained since the end of the 1914-18 war.

"A great advantage of the Cambridge system, and the envy of foreign technological institutions, is that these engineers live with the students from all other faculties, including the arts. They play a prominent part in all branches of college life, from games (five Cambridge engineers rowed at Helsinki this year and one was the captain of the British Olympic athletic team) to the editing of the undergraduate newspaper *Varsity*.

"This mingling of all types is good for the engineers and it does the others no harm. It may not teach them much technology, but it at least shows them what engineers are.

"This is important, for there is much damaging confusion in the mind of the public about the position and standing of the engineer. The name no longer denotes a professional man only. It covers everyone from the highest to the lowest in the engineering industry, and many more besides, such as the plumber and the garage hand.

"Professional engineers embrace those who apply accumulated experience and accepted scientific methods to manufacture and construction, and a smaller group, now given a new, slightly intimidating name. These latter are technologists or applied scientists, whose business it is to develop new methods and processes. It is they who have developed the gas turbine and jet propulsion, who are making the use of atomic energy possible, and who have designed and built such electronic 'brains' as foretold Mr. Eisenhower's victory.

"The technologist is not produced easily. A young man must first complete a three-year course such as that in engineering at Cambridge, where he will be well grounded in fundamental sciences and mathematics and taught to bring an exact mind to the solution of problems. This course he will share with those destined for other engineering activities, such as management, and with officers from the Services.

"At the end of this course he must go into industry for some years to complete his practical training and learn what practical difficulties exist between a new idea and a new product. He may then return to a University as a research student to learn how to search for new knowledge.

"To provide a training ground for these students, research is conducted at Cambridge into almost every branch of engineering. Instead of becoming a research student, the young engineer may embark on a post-graduate course in his particular speciality. After these courses, or equivalent instruction in industry, the young man will be at the threshold of his career as a technologist.

"If it is asked why this long education and training is necessary, it will be from ignorance of what is involved in applying science for the benefit of the community.

"Most people seem to imagine that the pure scientist, buried in his laboratory searching for knowledge for its own sake, suddenly discovers something which he realizes at once has practical possibilities. He then calls in the mechanics, who immediately appreciate the discovery and go off to a factory when they easily turn it into a new device. How different are the facts!"

Professor Baker then described briefly two examples of work carried out in the engineering laboratories at Cambridge. One concerned with "blow-by" round piston rings, and another relating to the design of steel-frame buildings. His article then continued as follows:—

"Such applied science is truly creative work—a challenge to the best brains and character in the community. Outstanding qualities are needed, for seldom does the technologist, when out in the world, find many willing hands anxious to push his ideas. New methods upset existing organization; they give rise to economic and administrative problems, and into these fields he must be prepared to go.

"Other countries may be quicker to evolve and apply new technological methods to the advantage of their economy, but the reason is not so much the excellence of their teaching institutions—it is the enthusiasm and attitude of the whole community to engineering, which ensures a steady stream of the best brains into that profession.

"We in this country are proud of the development of the jet engine, proud of our Comets and our ships, but we are not as a people excited about engineering and keen to push forward with new methods. Because of our pre-eminence in the past it is taken for granted that someone will develop the engineering products on which our survival so largely depends. While a devoted band comes forward every year, it is not the accepted thing for our best and most enterprising men to enter industry on the technical side, as is the case in America and many European countries.

"Fortunately, industry is beginning to value and reward the work of the technologist adequately, but the supply of men falls far below the demand. If this country is to prosper, those who advise the young must turn more of the ablest men into this hard but essential service to the community."

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British air routes to South America, the Caribbean and West Indies

The British Overseas Airways Act, which received the Royal Assent in August, 1939, provided for the amalgamation of Imperial Airways and British Airways into a single public corporation: British Overseas Airways Corporation.

The Civil Aviation Act of 1946 set up "three chosen instruments" or nationally owned corporations. British Overseas Airways Corporation retained responsibility for the Commonwealth, North Atlantic and Far Eastern routes. Internal services and routes to the Continent were allocated to British European Airways. The third, British South American Airways (merged with B.O.A.C. in 1949), was charged with the development of services to the South American continent.

Between January and the beginning of August, 1946, B.S.A.A. opened the route between London, Lisbon, West Africa, Brazil, the River Plate and Santiago, Chile. The first survey flight left London for Buenos Aires on 1st January, 1946. Ten weeks and four days later the first regular commercial service began on the same route.

Services were operated twice a week between London and Buenos Aires, and from 27th June, 1946, once a week between London and Santiago — all with *Lancastrian* aircraft. Two hundred and seventy South Atlantic crossings were completed in the first year.

Later that same year, 1946, B.S.A.A. was also made responsible for the development of British air routes from London to the West Indies, Central America and the west coast of South America. *Lancastrian* aircraft were transferred from the east coast route and used to develop the new routes; *York* aircraft took over responsibility for the services to Brazil and the River Plate.

On the 22nd April, 1946, a survey flight was completed from London to Trinidad in the British West Indies via Buenos Aires, Santiago, Lima, Bogota and Caracas. The first proving flight crossed the Andes at 26,000 feet on 6th June, 1946. Twenty-one days later the first regular weekly service began between London and Santiago. The first survey flight to the Caribbean area left London on 17th July, 1946, calling at the Azores, Bermuda, the Bahamas, Mexico, British Honduras, Panama, Jamaica and Trinidad.

It was anticipated at the start of the financial year from April, 1947, to March, 1948, that *Lancastrian* and *York* aircraft would be withdrawn from the trunk routes and gradually replaced by *Tudor IV* and *Tudor V* airliners. Hopes in this direction did not materialize. B.S.A.A., the third corporation, was merged with British Overseas Airways Corporation by the Airways Corporations Act dated 30th July, 1949.

On 28th February, 1950, B.O.A.C. re-established the direct air route between Britain and Chile with new *Argonaut* airliners, the sector across the Andes from Buenos Aires to Santiago having been suspended for the previous year. By October, 1950, B.O.A.C. was also operating four *Constellation* services a week to Bermuda and Nassau, three a week to Jamaica, two a week to Panama, Lima and Santiago, and one a week to Havana.

The west coast services to Lima and Santiago were discontinued in April, 1951. In March, 1952, the *Constellation* service to the Caribbean via the Central Atlantic route was withdrawn in favour of a *Stratocruiser* service direct from London to the Caribbean via Prestwick, Gander, Bermuda, Nassau and Montego Bay. This is additional to the London-New York/New York-Caribbean service by *Stratocruiser*.

This, then, is the story of the development of British airline services to South and Central America and the Caribbean area. Like every good story it has its dramatic highlights, its moments of suspense, and its promise of greater things to come.

B.O.A.C. TAKES GOOD CARE OF YOU TO ALL SIX CONTINENTS

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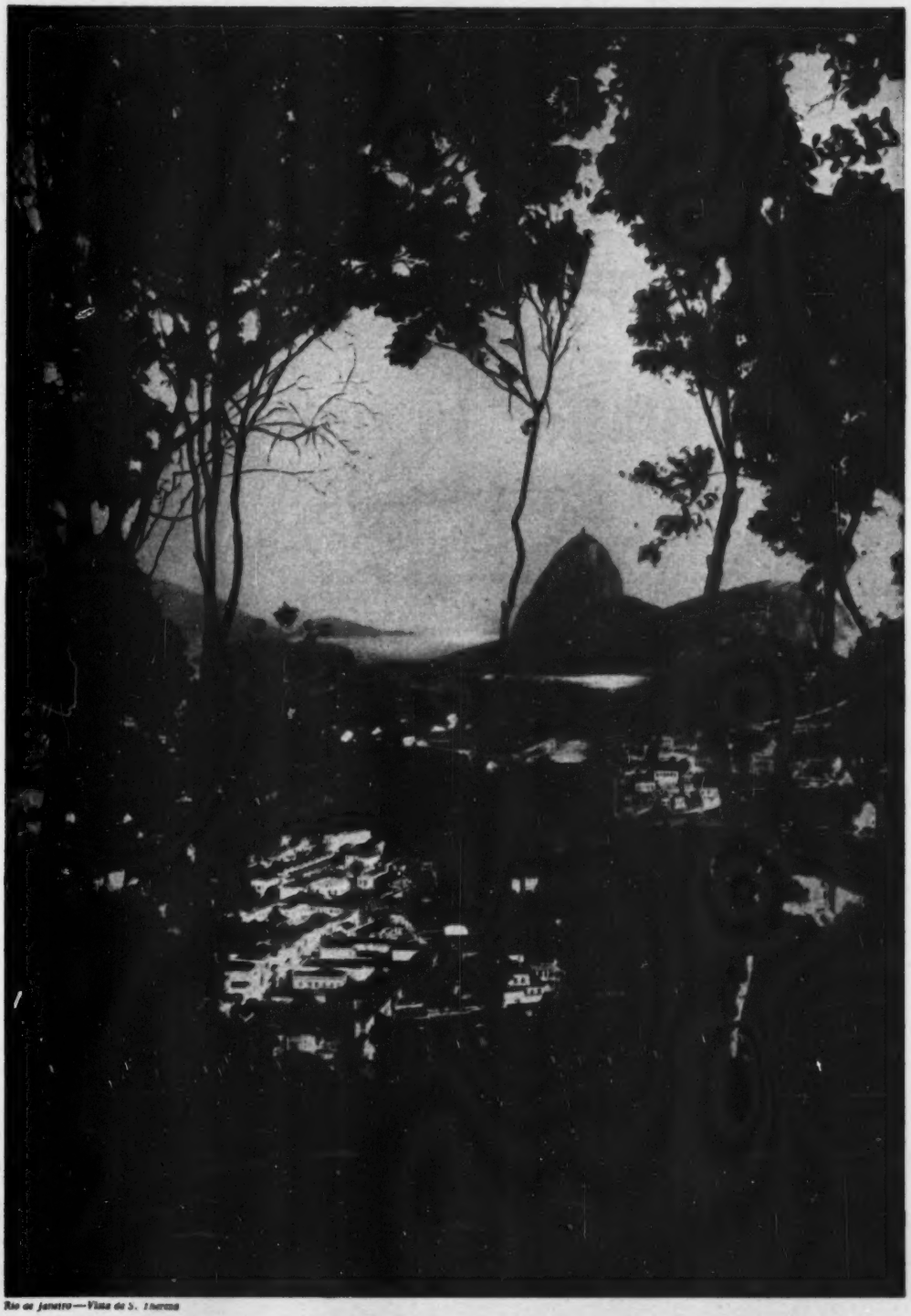
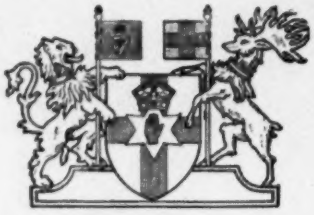


Rio de Janeiro—Vista de S. Theresa



GOVERNMENT OF NORTHERN IRELAND

An Invitation to Industrialists

NORTHERN IRELAND, with its existing structure of shipbuilding, aircraft, engineering and textile industry, still possesses ample reserves of labour for the manning of new production units.

To meet the requirements of new industrial undertakings the Government of Northern Ireland is willing to provide factory premises in suitable localities for leasing on specially favourable terms.

In addition, the Government is prepared, in approved cases, to provide financial facilities towards the cost of plant and machinery purchased and installed by the industrialist.

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CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

The Technician's Dilemma

WE, the undersigned, would like to say how heartily we endorse the views put forward by "J. H. W. W." in his article "The Technician's Dilemma" in your issue of November 14th.

Lest it be thought that our support of these opinions reflects on one particular firm, it should be added that we have no complaint whatever about our own treatment in comparison with that of technicians employed by other companies; our support for the majority of the points your contributor makes is based solely on our attitude to the question of conditions in the British aircraft industry as a whole.

Surrey. FORTY-SIX AERODYNAMICISTS.

[This letter is unique in bearing a whole page of signatures—46 of them, which we cannot afford space to include. The majority of the names carry suffixes denoting degrees and other professional qualifications.—ED.]

I HAVE followed with some interest the remarks in these columns regarding British engineers going to Canada and the U.S.A. I think it pertinent to add the following comments.

If the emigration of engineers is to stop—voluntarily—certain shortcomings of the industry will have to be eliminated. In my opinion, it is these anomalies, rather than economic incentives, that have made engineers dissatisfied, unable to find a "way out," and eventually travel west. I think the following suggestions should, and could, be put into effect:—

(1) Brighten the future of the young engineer by (*a*) providing better financial incentives to invest in becoming a trained man; (*b*) removing the age-salary scales and the consequent attitude of serving time. In my opinion this is grossly over-emphasised amongst technical grades—more recognition of, and incentive to do, hard work is required. The system of engineer grades, as used here in the U.S.A., might be considered.

(2) Remove pettiness from personnel administration, such as clocking-on and off. This method of time-costing design departments is neither efficient nor shows the respect that one would expect creative men to command.

(3) Invest in equipment. It is deplorable that a good design-team should be handicapped by lack of such basic equipment as a good wind-tunnel, an efficient structural-test organization, space for desired research facilities, and a flight-test department whose programme is not bogged down due to "sales" obligations and mods. due to inadequate pre-flight testing. Investment in test equipment will permit a better job to be done in a shorter time with far less tedium and strain for those doing it.

(4) Invest further in personnel training. There is considerable investment in personnel training today; however, there are still virtually no facilities for pilot-training within the budget range of the average technician. Pilot-training is a very real asset both to the man and the company he works for. It seems unenterprising on somebody's part that company-sponsored pilot-training has not been put into effect. Allowing for tax reliefs, the net outlay appears to be small.

None of these shortcomings exist to any extent in the U.S.A. In the long run they are far-reaching. If they were removed from British industry, the attractions of doing individually more interesting work, working in a nationally more stabilized and efficient industry, and working with engineers better appreciative of the other man's problems, will become very apparent.

California. BRITISH TECHNICIAN.

THERE is general agreement that compared with other professions, the engineer enjoys (apparently) a lower social and financial status. Indeed, the average member of the public only becomes aware of engineers through such newspaper headlines as "5,000 Women Engineers on Strike in Birmingham," or "6,000,000 Engineers Asking for 2s 6d an Hour Wage Increase."

The engineering institutions are unable to help the professional engineer by virtue of the provisions of their royal charters, which limit their activities to developing the science of engineering.

Until recently, no representative body has existed whose sole concern is with the professional engineers. Such a body now exists, namely, The Engineers Guild, which is not a trade union, but whose concern is with professional engineers, their status, their opportunities of promotion, their conditions of service, their remuneration and their relations with the community.

One thing remains certain—that the position of the technician will not improve by some spontaneous evolutionary magic. It will only come about when those concerned unite and show themselves willing to "put something in" instead of expecting that a small annual subscription to some organization will automatically ensure their future health and prosperity.

Sandiacre, Nottingham. J. F. HARRIMAN.

[The offices of the organization mentioned by our correspondent are at 78 Buckingham Gate, London, S.W.1.—ED.]

More About the Brisfit

MAY I add my humble congratulations to J. M. Bruce for his recent articles on the D.H.4 and Bristol Fighter which have of late appeared in your journal? After reading the article on the Brisfit, I scanned my own jottings and present these additional details for the record:—

Service use.—No. 5 Sqn. reformed with Brisfits in 1920 from 48 Sqn. at Quetta. No. 16 Sqn. reformed on April 1st, 1924, at Old Sarum with Brisfits, which were eventually replaced, I believe, by A.W. Atlases. No. 51 Sqn., which formed at Thetford on July 15th, 1916, under Maj. M. Wyllie (using the B.E. 2c, B.E. 12, Avro, and F.E.2), was using F2Bs at Marham in 1918 and up to disbandment on June 13th, 1919. No. 75 Sqn. used Brisfits at Elmswell in 1918, moved to North Weald in May 1918, and, still using Brisfits, disbanded there in 1919. No. 76 Sqn. was operating Brisfits from Tadcaster in 1919. Can anyone confirm that No. 77 did in fact use Brisfits? No. 141 had Bristol Fighters in 1917 and in 1918 was part of 49 Wing at Biggin Hill.

Notes on Individual Machines.—B1152, "C" of 22 Sqn.; B1223 and B1329 both used by No. 2 Sqn.; B1251 used by 62 Sqn.; C4197 and C4625 both used by 67 Sqn. at Ramleh, Haifa; C4810, "N" of 22 Sqn.; D7864, F4688 and J8430 used by 24 Sqn.; E2610, "3" of 88 Sqn.; E2624, "4-A" of 4 Sqn.; F4442, "1" of 88 Sqn.; F4490 used by 2 Sqn.; F4513 used by 16 Sqn.; F4542 used by Cambridge University Air Squadron; F4928 and FR4744 used by 6 Sqn.; F4566 used by 5 Sqn.

Serial numbers in "H" ranges were, I believe, H926-1060 inc., H1240-1707 inc., and H1708-1739, some in the latter batch not being completed. H1415 and H1526 went to No. 2 Sqn. Serials in the "J" range included J6586-6800 inc., and J8428-8458 inc. J6592 and 6662 went to 2 Sqn. and J6685 to Oxford U.A.S.

Perhaps the most interesting news I can offer is that D8096 is *not* the only remaining Brisfit in Britain. E2581 (significantly bearing "13"!) was on show in a hangar in excellent condition at Feltwell during the recent Battle of Britain "At Home."

Cambridge. M. J. F. BOWYER.

FAR be it from me to detract from Mr. Bruce's very comprehensive article (November 7th) on the Bristol Fighter, but I do feel that a little space might have been devoted to the Bristo type-numbers involved. Brief mention is made of one or two of them in the data under the sub-title "Mark Numbers," and I feel the following résumé might be of interest: Type 12 F.2A, all variants; Type 14 F.2B, Falcon variants; Type 15 F.2B, Sunbeam Arab; Type 16 F.2B, Hispano-Suiza; Type 17 F.2B, B.H.P. (Puma); Type 27, original civil conversion; Type 28, civil, 3-seat, Puma; Type 29, civil, two-seat, Puma; Type 34 F.2B seaplane project; Type 76 Fighter, Jupiter 4; Type 96 F.2B Mk 3; Type 96A F.2B Mk 4.

A point of interest rises from the "Light Fighters" article in the same issue. All my references for the Blackburn Blackcock, which includes a type list from Blackburn and General Aircraft, Ltd., refer to a R.R. Falcon engine. However, as I have a power output given for this engine as 510 h.p., I am rather interested in your writer's mention of a Kestrel being fitted, which does seem much more in keeping with the date.

Grimsby, Lincs. P. H. T. GREEN.

[As remarked in our article, the Blackcock was never flown with a Rolls-Royce engine. The unit concerned was known originally as a Falcon, but differed so greatly from the Falcon that the designation Rolls-Royce "F" was adopted. Eventually this was superseded by the name Kestrel.—ED.]

MAY I congratulate Mr. J. M. Bruce on the excellent articles on the D.H.4 and Bristol Fighter? It is most fitting that a comprehensive history of the most famous aircraft of the Kaiser's war should be compiled and, judging by correspondence already published, the series is proving extremely popular with your readers.

Your article on "Light Fighters" revived my interest in the

CORRESPONDENCE . . .

Grain and East church Kittens. If more suitable engines had been available at the time, no doubt we should have had at least one of these aircraft in production. These small shipboard fighters are probably unknown to many of your readers, who, I am sure, would welcome further information. Perhaps Mr. W. H. Sayers could be persuaded to tell the story of the Kittens?

Cirencester. E. W. TURNER.

THE article on the Bristol Fighter was very interesting. In 1947 I visited Primrose Garage, Watford, owned by C. P. B. Ogilvie, who showed me Bristol Fighter No. D.8096, which he had converted to dual control, with plenty of spares, etc., to last quite a time.

Croydon, Surrey. C. HOLLAND.

[Numerous other appreciations of J. M. Bruce's articles on the D.H.4 and Bristol Fighter have been received. Below are some typical extracts.—ED.]

"I want to tell you what a lot of pleasure the article on the D.H.4 has given to people here."—MARTIN SHARP, de Havilland Aircraft Co. Ltd., Hatfield.

"Please let us have many similar articles."—E. J. ARNSBY, London, S.W.7.

". . . a most excellent and comprehensive article. The photographs, and especially the three-view drawing, combine to make the D.H.4 article what must surely be the most complete ever published on this aeroplane."—F/L. D. A. S. MCKAY, Leicester.

"I should like to congratulate *Flight* on the D.H.4 and Bristol Fighter articles. They are excellent."—E. DONOGHUE, London, N.13.

"May I congratulate you, and Mr. J. M. Bruce, M.A., on the fine article on the D.H.4?"—S. GOMERSALL, Leeds.

Light Fighters

IN the excellent article "Light Fighters" in your issue of November 7th, mention is rightly made of the B.A.T. Bantam. It is not generally known, however, that the Bantam was preceded by an earlier Koolhoven design built by the B.A.T. concern.

This was the B.A.T. F.K.22 Bat, which seems to have begun life with the 100 h.p. Gnôme Monosoupape rotary engine—at least, it is certain that a B.A.T. scout was built and flown with that engine—and may have been later fitted with the equally obscure 120 h.p. A.B.C. Mosquito six-cylinder radial. The latter form was certainly projected. The Gnôme-powered machine had a span of 24ft 8in and an all-up weight of 1,260 lb, so it seems to fall within the category of light fighters. The A.B.C. version was expected to weigh about 1,100 lb loaded. The Gnôme-Bat (if such it was) had a maximum speed of 100 m.p.h. at 10,000ft; climbed to 6,500ft in 9.1 min, to 10,000ft in 16.8 min, and to 15,000ft in 43 min.

The Mosquito-powered machine had a monocoque fuselage made up of ash formers with three-ply birch sides and covering. In cross-section it was (or was to be) more or less elliptical and almost filled the gap between the wings in much the same way as did the Bantam's fuselage. The pilot's head protruded through a hole in the centre-section.

I have further and more detailed data on this machine, but my point in mentioning it is not only to add another to the list of British light fighters, but to ask (in the way Mr. Gaylard suggests in his letter, reproduced in the same issue of *Flight*) whether any of your readers can clear away some of the mystery which surrounds this little aeroplane. Do any photographs exist? Does anyone remember seeing the Gnôme-powered machine fly, and, if so, was it really known as the B.A.T. Bat in that form? And was the version with the A.B.C. Mosquito ever built?

Since mention was made in the article of German machines of the recent war, it might not be inappropriate to recall the remarkable little L.F.G. Roland U.I., a monoplane nicknamed "Put-bus," which appeared in 1918. It was designed for use (believe it or not) from submarines. Span was 6.6 metres (21ft 7¾in), weight loaded, 694 kg (1,527 lb), and its speed was 170 km/hr (about 106 m.p.h.). Nor was the "Put-bus" the first German aeroplane designed to operate from a submarine. In 1917 there appeared the Brandenburg W.20, a diminutive single-seat flying-boat with an 80 h.p. Oberursel motor. Its wing span was 6.8 metres (22ft 3¼in), it weighed only 567 kg (about 1,247 lb) loaded, and had a speed of 117 km/hr (about 73 m.p.h.). It could be assembled ready for flight in 2½ min and dismantled again in 1½ min. Another German machine designed to be carried by submarines was the Heinkel U.1, but this seems to have been an immediate post-war type. It spanned 23ft 7¾in, weighed 1,212 lb loaded, and could do 75 m.p.h. under the urge of its 60 h.p. Siemens Halske engine.

Finally, to revert to British aeroplanes, the tiny Westland Wagtail should not be omitted from any catalogue of light fighters, nor, historically speaking, should the Pemberton-Billing P.B.9, or "Seven-day bus," which was probably the first "utility" aeroplane intended for military use to be built.

Birmingham. J. M. BRUCE.

Forecasts and Forecasters

WITH regard to the recent letters on the above subject, I have two comments to make.

(1) Many pilots think that weather forecasting is an exact science. We all know only too well that this is not the case; indeed, even our knowledge of the various processes that make weather is still very limited. Our research workers are doing good work, but at the present slow rate of progress, due mainly to ridiculous Governmental restrictions allowing only a miserly sum to be spent on research, it will be many, many years before we can produce reasonably exact forecasts, *especially* in marginal conditions. Anyway, how often does the actual weather ever remain the same, even for one hour? If some of these complaining pilots would only try and help the forecaster, by coming into the meteorological office themselves, after a flight, and discussing the weather experienced, they would do more good to improve forecasts than by inconsiderate criticism of usually overworked forecasters, working long night and day duties on a four-day roster.

(2) Facilities do exist for forecasters to make familiarization flights over routes for which they normally forecast. This is thought by most forecasters to be an excellent and very necessary thing. However, at the present time, due to an almost incomprehensible mass of red (Civil Service) tape, it has been possible for only a few forecasters to fly with one British airline. (Incidentally, the Government must regard their forecasters as being very precious and delicate of health, as they require, first, a stringent medical examination and, secondly, many more inoculations than international regulations think fit for the mere passenger.) If *all* airlines (British *and* foreign) and Service authorities offered easily obtainable familiarization flights to forecasters, the experience obtained would be invaluable for the improvement of weather forecasts for aviation.

Middlesex. WEATHER FORECASTER.

Helicopter Stations

TO the heading, "Airstop, Helidrome or Rotorstation?" (page 628, November 14th) I answer "No" on all three counts. Euphony, precedent and logic add up to but one answer.

If I travel to America by surface transport, I go by train from Waterloo Station to the seaport of Southampton and thence to New York. Similarly, if in 1962 I arrive by air, I will have flown, *via* London Airport, from Waterloo Air Station. Seaport and airport for overseas travel; railway station, bus station and air station for internal, short-haul trips.

Another point: why, by inclusion of "rotor-" and "heli-" allusions, prejudice operators of inter-city services against fixed-wing aircraft? I look forward to some healthy competition in the next decade or two by products of Scottish Aviation and others for the use of air stations.

Diss, Norfolk. PATRICK D. RAWLENCE.

FORTHCOMING EVENTS

Nov.	29.	S.I.A.E.: "The Bristol Proteus Gas Turbine," by D. Dekkers.
Dec.	2.	R.Ae.S. Graduates' and Students' Section: "Aerodynamics of Wind Tunnel Design," by J. C. Gibbings, Ph.D., B.Sc.(Eng.), Grad.R.Ae.S.
Dec.	3.	Royal United Service Institution: "The Air Battle," by Air Chief Marshal Sir Robert Saundby, K.B.E., C.B., M.C., D.F.C., A.F.C.
Dec.	4.	R.Ae.S. Section Lecture: "Air Traffic Control Today and Tomorrow," by Capt. V. A. M. Hunt, A.F.R.Ae.S.
Dec.	5.	Helicopter Association: "Simulation of Flight Loads by Ground Tests," by M. J. Brennan, B.Sc., and R. Hafner.
Dec.	5.	Herts and Essex Aero Club: Annual Dinner and Dance.
Dec.	6.	Northern Heights Model Flying Club: Annual Dinner and Dance.
Dec.	13.	British Interplanetary Society: "Guidance and Control of Missiles," by J. Humphries, B.Sc.(Eng.), A.M.I.Mech.E., A.F.R.Ae.S.
Dec.	13.	British Interplanetary Society, Birmingham Branch: "Fundamentals of Nuclear Energy Generation," by Dr. D. C. Leslie, M.A.
Dec.	16.	R.Ae.S. Graduates' and Students' Section: "An Introduction to Aircraft Vibration," by D. J. Mead, D.C.Ae., Grad. R.Ae.S.
Dec.	16.	R.Ae.C.: Film Show, Londonderry House.
Dec.	17.	Institute of the Aeronautical Sciences, New York: Sixteenth Wright Brothers Lecture.
Dec.	17.	Aircraft Recognition Society: Brains Trust.
Dec.	18.	R.Ae.S.: Full-day Discussion on "Fatigue."
Dec.	19-20.	Institution of Production Engineers: Conference on Problems o Aircraft Production.
Dec.	20.	British Interplanetary Society, Manchester Branch: "Rocket-motor Testing," by D. Hurden, B.A.
Dec.	30.	Plymouth Aircraft Recognition Society: Meeting.
Jan.	3.	British Interplanetary Society: "Planetary Engineering," by E. Hope-Jones, M.A.(Cantab.), F.R.A.S., A.M.I.Mun.E.; "Landing on Airless Planets," by R. A. Smith.
Jan.	17.	Aircraft Recognition Society: Sixth All-England Recognition Contest.
Feb.	9.	Institute of Transport: Brancker Memorial Lecture: "The Influence of Military Aviation on Civil Air Transport," by Sir Frederick Handley Page, C.B.E.
Mar.	24-26.	Institute of Metals: Annual General Meeting and (Mar. 25) All-day Symposium on "Control of Quality in the Production of Wrought Non-ferrous Metals."

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For further information: European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W1, England.

Vignettes of CANADA—AIR LAND

Doctor parachutes to stricken child . . . recently an Army doctor and two R.C.A.F. helpers were dropped by parachute to an isolated New Brunswick village, where the 8-year old daughter of a fisherman was fighting for her life, suffering from a ruptured appendix.
Such humanitarian services on the part of the men of the R.C.A.F. and Army represent but one of the many stories being written in the annals of Canada's air history.
The use of aircraft has indeed become an established part of Canadian life in a country that has been air-minded since flying began.

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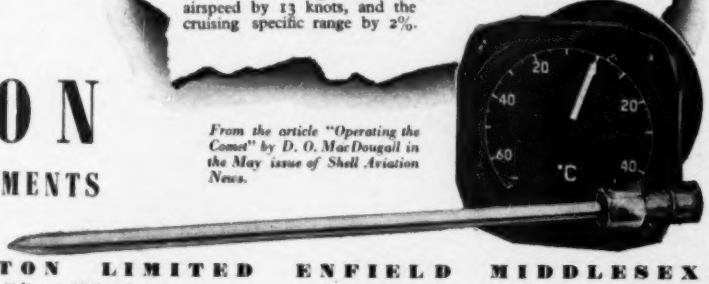
ACCURATE INDICATION OF AIR TEMPERATURE GOVERNS THE WHOLE ECONOMY OF OPERATION

Weston Thermometry has been chosen for several applications on the De Havilland 'Comet' including fuel temperature, cabin air temperature, wing and tail de-icing as well as outside air temperature.
Illustrated is the Model S.110G/9 Thermometer Bulb with its associated Indicator, the Model S.63 circular scale Ratiometer used for outside air temperatures.

Flight Planning The air temperature is one of the most important factors in the operation of a long-range jet aircraft as it influences the rate of climb, the heights at which the aircraft will cruise, and hence the true airspeed. The latter in turn determines the specific range (air miles per pound of fuel) since within limits, fuel consumption per hour at the normal cruising altitudes does not vary much. It can be seen therefore that air temperature controls the choice of flight path, largely determines the fuel load carried, and governs the whole economy of the operation. The effect of air temperature on Comet operations can be illustrated by the fact that a 10°C. rise in temperature reduces the cruising altitude by 2,000 ft., the true airspeed by 13 knots, and the cruising specific range by 2%.

From the article "Operating the Comet" by D. O. MacDougall in the May issue of Shell Aviation News.



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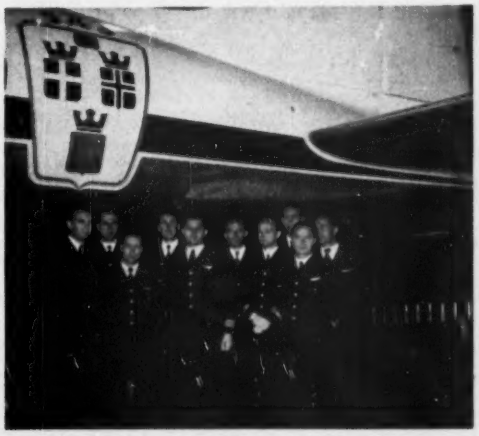
CIVIL AVIATION

MARATHONS IN SERVICE: The first airline operator to use the Handley Page (Reading) Marathon (four D.H. Gipsy Queen 70s) is West African Airways Corporation, which opened a Marathon service on November 1st between Accra and Lagos. Three of the Corporation's new 18-seaters, attractively finished, are pictured at the latter airport.

NORTHERN PATHFINDER

NAMED *Arild Viking*, and bearing the three-flag insignia of the Scandinavian Airlines System, a new Douglas DC-6B completed, on November 20th, the first commercial crossing of the Atlantic by way of the Arctic. The aircraft took off from Los Angeles at 16.56 hr (G.M.T.) on November 19th, arriving at Kastrup, Copenhagen, 27hr 52 min later after an uneventful flight *via* Edmonton and Thule, the new American base in Greenland. Regular "Arctic Express" services over this route will, it is hoped, begin early in the New Year; a second proving flight will be made in a few days' time. In addition to its crew of eleven, illustrated at the foot of this page, *Arild Viking* carried 22 passengers, including Col. Bernt Balchen, the Arctic-navigation expert, the Danish and Norwegian Ambassadors to the U.S.A. and several senior executives of S.A.S.

The commercial opening of the Arctic route owes much to the work done by the R.A.F. and U.S.A.F. since the war in overcoming the problems of Polar navigation. The navigators aboard *Arild Viking*, Einar Pedersen and B. Heiberg-Andersen, both had considerable experience of Arctic operations, and the former is the author of a number of books and articles on the subject. From Edmonton to Thule, and from Thule to the east coast of Greenland, their flight was planned on the Greenwich grid system, changing to the conventional magnetic-compass method for the remainder of the journey. The magnetic compass is, of course, completely unreliable in the extreme Polar regions, so direction had to be maintained by the use of gyro-compasses in conjunction with astro-navigation. Use was also made of two methods of checking position: one, known as "target timing," involves the use of radar; the other, developed by Col. Balchen, uses air-pressure readings at known height as a means of fixing.



OVER THE TOP: Crew-members of the S.A.S. Douglas DC-6B which, as reported above, has completed a 5,940-mile proving flight from Los Angeles to Copenhagen via Edmonton and Thule: (left to right) Capt. P. Jensen, Nav. B. Heiberg-Andersen, Capt. S. Gibson, F/Eng. W. Wamalar, Capt. A. G. Pronsen, Purser F. Jacobsen, Nav. E. Pedersen, Purser P. B. Inset, R/O. T. Forsberg and R/O. K. Türk. Another member, not shown, was F/Eng. E. Ernstgard.

ASSISTING JAP AIRLINES

THE Japanese Ministry of Transportation is reported to have drawn up a five-point plan for promoting the growth of airline services. Assistance is expected to take the following forms: (1) Aid in construction of airfields, the Ministry paying half the cost borne by municipal authorities. (2) Extension of Government guarantee for payment of loans granted to airlines. (3) Preferential treatment in respect of taxes and the limit of debenture bonds to be floated. (4) Subsidies for certain developments of airline operations, such as extension of overseas routes. (5) Support for airlines in obtaining new equipment, either by chartering aircraft owned by the Government or by subsidizing their purchase.

THE GERMAN REVIVAL

IN a recent statement, the West German Government said that an "air transport equipment company" will very soon be formed to make preparations for establishing the German airline. It is not yet known when the airline will be formed; at present, the occupation statute forbids Germans to fly aircraft, and this restriction will continue until the Western Powers ratify the Bonn convention (probably within the next few months). Meanwhile, the German Ministry of Transport is considering a number of recommendations made by a special committee formed a year ago to study all the problems associated with setting up an airline.

The new Lufthansa, the committee decided, would need a capital of 150m marks (some £13m), to be provided by the Bonn Government, State Government and private investors. Waiving of customs duty on aircraft imported from abroad was recommended. The airline should serve (in addition to German and other European cities) the U.S.A. and South America, the Middle and Far East and Africa; 24 aircraft would be required—12 twin-engined and 12 four-engined.

CHARTER NOTES

AMONG the more interesting charter flights completed by British independent airline companies last week was an inclusive sightseeing holiday tour of the Middle East, undertaken by B.K.S. Aerocharter on behalf of United States Service interests in Germany. The trip comprised a 7,000-mile tour for 25 servicemen on European leave. They left Munich by B.K.S. Dakota and flew to Jerusalem via Nice, Bari, Athens and Cairo, returning via Crete instead of Cairo. B.K.S. also flew 25 NAAFI personnel to and from Cyprus. Skyways of London, busy as usual with their many trooping activities, flew from Bangkok to Amsterdam with a load of miscellaneous cargo for K.L.M.

On the Berlin airlift, Air Charter's Yorks completed 23 passenger trips, carrying 1,150 refugees to Hanover, and 47 freight flights taking 376 tons of cargo to Hamburg. Silver City's Bristol 170s made 48 trips to Hamburg with a total of 240 tons of bulky freight. Other Silver City cargo flights included four from Le Touquet to Lympne, one to Tripoli for the Iraq Petroleum Company, and one to Algiers.

Compared with recent weeks, operations for the week ended November 22nd represent a drop of some 25 per cent in mileage and revenue; this is the result of a market lull before the usual Christmas rush. Altogether, last week, 130 *en route* flights were completed, 118 of them in Germany, on the airlift. Of the total, 102 were cargo flights and 28 were with passengers. About 74,500 miles were flown in all, 19,000 on passenger trips and 55,500 with freight; cargo carried was an estimated 643 tons and passengers flown numbered about 1,280. These figures represent about 139,000 freight ton-miles and 467,000 passenger miles.

This week the Bristol 170 was the most flown aircraft, with 32,500 miles; Yorks only just lost the lead which they have held for so long and came a close second with 31,000 miles; Dakotas covered 11,000 miles. The week's flying occupied 470 hours and netted an approximate revenue of £38,000.

CIVIL AVIATION . . .

VISCOUNT 724s FOR CANADA

AS we closed for press last week we were able briefly to forecast an important Canadian order for Vickers Viscounts. The full story was subsequently told by Mr. George Edwards, the designer, and Mr. Roberts, European manager for Trans-Canada Air Lines, at a meeting in London.

This T.C.A. order is for 15 Vickers Viscount 724s (Rolls-Royce Dart RDa3 turboprops) to the value of 11.5 million dollars (£4.1 million). About 10 per cent of this sum represents spares, and thus the present price of the Viscount—a little under £250,000—is very competitive and shows up other machines in the same-size class. Deliveries are to begin less than two years from now, in September 1954, and are to be completed by April 1955.

T.C.A.'s Viscounts will be the first turboprop airliners to operate in North America, and Comets in the hands of C.P.A. the first turbojet types. This Viscount order is the largest single dollar contract to be signed for a British product since the war.

Canada's internal air traffic has increased, during the last three years, at the healthy rate of 20 per cent per annum. The 48-seat Viscounts will be used to supplement—not to replace—the North Stars and DC-3s at present in use, and they are expected to enter T.C.A. service on the Toronto - New York - Montreal triangle. Later they will operate on all main routes, including those serving other major American cities.

Although the seating arrangements foreseen for T.C.A. Viscounts will allow for 48 passengers, the now general practice of mounting the seats on rails will permit considerable flexibility—opening or closing pitch, and fitting four or five seats abreast. The maximum capacity of the cabin is 54 seats.

The Series 700 Viscounts are larger than the prototype 630, and the Rolls-Royce Darts are more powerful—giving a maximum of 1,400 b.h.p. plus 365 lb thrust (as compared with the 1,000 s.h.p. of earlier units). At present Viscounts are being manufactured at Weybridge, but Vickers-Armstrongs' factory at Hurn, which at present employs a total of 800 workers, mainly concerned with production of the Varsity, is being built up so as to augment Viscount production. The ultimate output envisaged is 100 aircraft per annum by 1955. It is estimated that another 600 or 700 production staff will be recruited at Hurn, which, together with the administrative side, will mean a total increase of some 1,000.

For a while two separate production lines will be running with the first aircraft appearing from the Hurn line in eighteen months' time. After this the Weybridge line will probably be slowly tailed off. Two figures for top American production-rates were quoted by Mr. Edwards as a reminder that British manufacturers could, in fact, produce as well as design and build their aircraft. They were Convair 240, 109 per annum; and DC-6, 93 per annum.

To have secured the T.C.A. order in the face of very keen American competition reflects great credit upon Vickers, their aircraft and, we believe, on Mr. George Edwards personally. T.C.A.'s statement that the order follows exhaustive analysis we can well believe; moreover, it depended upon the incorporation of a pretty formidable list of modifications to suit T.C.A.'s special requirements, and more particularly to cope with the extremes of cold likely to be experienced by all North American operators. It seems that while the order hung in the balance the list of essential modifications was analyzed in the shortest possible time; Mr. Edwards then personally flew to Montreal with the answers.

Interested Canadian visitors to the Vickers assembly-line at Weybridge on November 22nd—three days after the T.C.A. order had been announced—were the Hon. T. C. Douglas, Prime Minister of Saskatchewan, and his daughter Shirley. They are pictured inspecting one of the Dart RDa3 turboprops of a B.E.A. Viscount.

It should be made clear that such is the state of development of the Viscount that it has sold on its operating economics as worked out by the customer, regardless of the passenger appeal and other advantages which accrue from turbine power.

A Viscount is to fly to Canada early in February next year for what are described as technical exercises. It is probable that this opportunity will also be taken to visit and make a demonstration tour in the United States. The C.A.A. have not yet been approached regarding the certification of the Viscount.

Mr. Edwards pointed out that the Viscount is becoming suitable for work traditionally done by DC-4s, of which there are 600-odd in use today and which will need to be replaced. There is, he estimated, a potential world aircraft-market conservatively estimated at £1,000 million over the next ten years, with as much again to be spent on spares and equipment. This takes into account scheduled airlines alone, and is based on current civil values. The British industry collectively is fortunate in having certain aircraft types which America and other countries have not. Mr. Edwards said that his personal estimate of the British lead in turbine transport was five years. Those who started five years ahead would know a great deal, but it was important that in addition to having the best aircraft we demonstrated that we could give American-style service as well. "Wearing neutral-tinted glasses," observed Mr. Edwards, "one could see a potential for 200 Viscounts—and with fairly rosy glasses the figure might well be 350."

There seems to be a definite world-wide move towards abandoning large twin-engined aircraft, and this must favour Viscount sales. Moreover, it is hard to see where real competition is to be found for the Viscount, if only because there are no suitably developed turboprop engines in the 1,500-2,000 s.h.p. class in production to provide the power.

(*Continued at foot of opposite page*)

Mutual satisfaction: Key men involved in the £4.1m T.C.A. order. Mr. George Edwards (left), chief designer of Vickers-Armstrongs, Ltd., played a material part in selling the Viscounts to Trans-Canada Air Lines, whose chairman is Mr. Gordon McGregor (right).

CONGRATULATIONS

THE following are among the congratulatory messages received by the makers of the Vickers Viscount following the signing of the T.C.A. order for fifteen of these aircraft :—

From Mr. R. A. Butler, Chancellor of the Exchequer, to Sir Ronald Weeks, chairman of Vickers, Ltd.—"Congratulations on your T.C.A. order. Your drive and initiative point the way."

From C. D. Howe, Deputy Prime Minister and Minister of Trade and Commerce, Ottawa, to Sir Hew Kilner, deputy chairman and managing director (aviation), Vickers-Armstrongs, Ltd.—"It gives me great satisfaction to approve the contract between Vickers and T.C.A. for fifteen Vickers Viscount aircraft built to Canadian standards. This order will provide T.C.A. with modern aircraft of latest British design, and will also help to correct balance of payment between our two countries."

Mr. McGregor, President of T.C.A., to Sir Hew Kilner.—"It is with satisfaction that Trans-Canada Air Lines is now able to announce the successful completion of the contract for the purchase of fifteen Viscounts. This aircraft has been selected on its merit in open competition, and we are confident that it will prove a most valuable addition to our North American fleet."

BREVITIES

THE total of international airline traffic transactions put through the I.A.T.A. Clearing House in London during September was $21,060,000 (over £7.5m)—representing a slight increase on the previous monthly record, established in July.

* * *

Skyways, Ltd., announce their acquisition of the five Yorks formerly operated by Eagle Aviation, Ltd., bringing the former company's York fleet to 29; the expansion strengthens Skyways' claim to being the largest European independent operator. Eagle Aviation will continue to operate their twin-engined fleet of three Dakotas and three Vikings, and to develop their maintenance and repair service (Eagle recently purchased Aviation Servicing, Ltd., at Blackbushe); they will, it is stated, also retain their interest in the possibility of flying-boat operations.

* * *

The amount of freight (10,210 tons) carried by K.L.M. during the first nine months of this year was 10 per cent more than during the same period of 1951. All-freight services by K.L.M. Skymasters are operated between Amsterdam and Montreal (weekly), New York (three times weekly), Curacao, Johannesburg, Tehran and Bangkok (all fortnightly).

* * *

It was stated in the Libyan Parliament recently that Silver City Airways had been granted concessions to operate certain internal services in Libya; the company itself has declined to comment on the statement "for the present." The main traffic-centres in the Libyan kingdom are Tripoli and Benghazi, which lie 400 miles apart.

* * *

The first Lockheed Super Constellation powered by 3,250 h.p. Wright compound engines made a successful maiden flight, lasting just over two hours, on November 12th. The aircraft, designated R7V1, is a military transport version for the U.S. Navy capable of carrying 106 passengers; delivery of the civil Model 1049C is not due to begin until next year. K.L.M. occupy first place on the list of prospective customers.

* * *

Mr. A. J. Henderson, formerly of Airwork, Ltd., takes up a new appointment on December 15th as secretary to Skyways, Ltd., and Lancashire Aircraft Corporation, Ltd. He takes over these duties from Mr. E. Barker, who remains secretary of Eric Rylands, Ltd., and Samlesbury Engineering, Ltd. The appointment is also announced of Mr. K. H. Blackham, formerly airport manager at Dusseldorf, Koln, Wahn and Hamburg, as Skyways' manager at Hamburg.

ARRIVAL FROM THE ARCTIC: The scene at Kastrup, Copenhagen, on the evening of November 20th; S.A.S. DC-6B "Arild Viking" has just completed its pioneer flight from Los Angeles by way of Greenland—arriving 12 min ahead of schedule. The journey, accomplished in less than 23 hr flying time, is recorded on page 681.

* * *

Operations by Trans-Australian Airlines during the financial year ended June 30th resulted in a loss of £A74,438 (£59,550 sterling) compared with a profit of £A204,799 (£164,639 sterling) for the previous year. The number of passengers carried, 670,406, was 10 per cent more than the previous year's figure, and the number of passenger-miles flown rose from 289.4m to 318.9m. The airline reported that a 13 per cent rise in revenue to £A5.6m had not been sufficient to offset rising costs.

* * *

Publication is announced by I.C.A.O. of a book which sets out the most efficient and economical way of organizing search and rescue operations and of establishing the necessary organizations. The need for uniformity of procedure is underlined by the fact that such operations may take place in widely varying conditions, and may involve aircraft and ground parties from three or four nations. Copies of the *Search and Rescue Manual*, which is available in English, French and Spanish, may be obtained at a cost of 7s. from H.M. Stationery Office.

VISCOUNT 724s FOR CANADA (continued) . . .

Regarding Viscount orders, the total is now 78, three more (from an undisclosed operator) having been added last week. Of these, 63 can be named as follows :—B.E.A. 26, Air France 12, Aer Lingus 4, T.A.A. 6, T.C.A. 15. Mr. Edwards revealed that there were serious enquiries, in some instances amounting to preliminary negotiations, from operators on all six continents, counting South America.

It is interesting to note that B.E.A.—to whom great credit is due for early recognition of the Viscount's virtues—ordered 701s when the all-up weight was quoted as only 50,000 lb and, incidentally, when no one else was very interested. Last week a C. of A. was granted for the first *Discovery*-class machine at 56,000 lb, and during 1953 the weight will be increased further to 58,500 lb. T.C.A.'s Viscounts will thus be delivered with a C. of A. for the new a.u.w. The whole of their extra 8,500 lb will not be given over to payload, however, because a few hundred pounds of extra weight will be entailed by the cold-weather modifications.

Vickers have already worked out figures for a "long-range version" capable of taking full advantage of the ultimate all-up weight (58,500 lb). Carrying a payload of 8,700 lb (equivalent to 43¼ passengers and their baggage) plus average fuel-reserves, it will cope with block distances of 1,700 statute miles. This version, carrying extra tanks but not the cold-weather equipment in T.C.A.'s machines, should be ready in 1955.

To date the prototype 630 has completed 1,090 hours, the first larger Viscount, 893, and B.E.A.'s first *Discovery*-class, 117. Both types have carried out successful tropical, high-altitude, and de-icing trials, and it will be remembered that the 630 made several trial passenger-carrying flights for B.E.A. during 1950. B.E.A.'s second machine is practically ready for delivery.

Mr. Edwards hopes that Viscounts will be adopted to replace the Vikings of the Queen's Flight.

Until now B.E.A. have been the most northerly operators of Viscount customers. Among the special needs now named by T.C.A. are extra internal heating for outside ground-level temperatures down to —40 deg. C—this simply means larger internal aircraft heaters; modifications to counter the ice which bombards the undersides of the aircraft on take-off and landing. This results from the slush thrown up from the runway freezing immediately as it passes through the air. Provision is also required for increased electrical loadings.

The only modification required to the Dart turboprops is the fitting of an increased-capacity alternator. On the next 150-hour development run a routine check will be made of the appropriate auxiliary drive. Tests are also being made with a synthetic lubricant which is thinner than natural oil under Arctic conditions and gives better lubrication for extremely cold starting. This will also be the subject of a test run under A.R.B. supervision. The Darts will have Rotol airscrews, and so far reversible pitch has not been considered necessary. Anti-skid brakes are expected to be adequate on ice-covered runways.

Mr. Roberts stated on behalf of T.C.A. that his company did not under-estimate the difficulties of introducing a completely new type of aircraft on Canadian routes, nor did they under-estimate the advantages of having two years' experience by B.E.A. to draw upon by the time they introduced their Viscounts. The Canadian operators are, of course, conversant with Rolls-Royce engines and service through the Merlins of their North Stars. The particular Darts concerned in the T.C.A. order are known either as RDa3s, or Rolls-Royce 505s. No increase in power figures is expected during the further development of these units, but the overhaul times are expected to go up considerably.

VICKERS VISCOUNT 724: LATEST OPERATING DATA

(Four Rolls-Royce Dart turboprops of 1,330 e.h.p.)

Developed gross a.u.w.	58,500 lb
Maximum payload	13,100 lb
Maximum continuous cruising speed at 23,000ft (mean weight, 47,000 lb)	336 m.p.h.
Recommended economical cruising speed	307 m.p.h.
Take-off distance to clear 50ft at sea level	4,800ft
Landing distance at 52,000 lb	2,640ft
Fuel consumption at 307 m.p.h.	244 imp. gall/hr

TYPICAL PERFORMANCE:*

Payload (lb)	Range (st. m)	Cost per passenger-mile (48 seats) (pence)	Cost per ton-mile (pence)
13,000	350	1.40	11.45
12,000	750	1.27	10.40
9,700	1,250	1.23	13.70

*Allowance is made for cruising speed of 301 m.p.h. (13,300 r.p.m.), with fuel reserves for 45 min stand-off at 10,000ft with one engine stopped, and for a 230-mile diversion to an alternative airport. Costs are based on 2,000 hours' annual utilization and fuel cost (kerosine) of 1s. 9½d. per Imp. gall.

CIVIL AVIATION . . .

FROM THE CLUBS

THE Royal Aero Club announces that Christmas cards for full members are now available; priced at 1s 6d each, they may be ordered from Mr. A. F. O'Connor, the house secretary. Reproduced on the cards is the well-known picture, showing the Wright Brothers launching an aircraft, which hangs over the fireplace in the Club bar.

THE headquarters of the former North Devon Flying Club at Wrafton has been leased from the Air Ministry by a new flying club as yet unnamed. Mr. Maurice Looker has been chosen as chief flying instructor and the secretary will be Mr. W. J. Bond. It is reported that in addition to providing private flying facilities the new club will re-establish an air link between the Island of Lundy and the mainland and will operate charter services.

"ONE of the reasons why we constantly had more flying than any other club," claims the Wiltshire Flying Club, "is that we maintain a fleet of 12 instructional aircraft so that when members do visit us on a fine day they do not have to stand in a queue to get an aeroplane." This policy, the club admits, does result in low utilization of the aircraft but is profitable in the long run. It is pointed out that the club which operates four aircraft, not only loses 50 per cent of its earning capacity if two aircraft are unserviceable, but has to complete repairs and adjustments in a hurry.

The Wiltshire club reports that its flying hours during September were 345, compared with 190 during September 1951, and 202 in October (22 hours more than in October 1951), bringing the total flying time from the beginning of the year to over 3,000 hours—an increase of nearly 50 per cent on the previous year's total.

ONLY one club can claim to have completed more flying hours than Wiltshire during 1952—the Airways Aero Club, which is at present based at Denham but which expects to move to Croydon by the end of the year. Flying time accumulated by the A.A.C. at the end of September was 3,429 hours and the club expects to reach the 4,000 hour mark by the end of the year. Since its formation in September 1948, the club has flown nearly 10,000 hours, mostly with ex-R.A.F. Magisters and Tiger Moths which were purchased at bargain price from the Ministry of Supply and dismantled, overhauled and rebuilt by members. These veteran trainers are now being sold and replaced by Auster Aiglets, of which three have already arrived at Denham with two more due for delivery in the near future. In fairness it must be recorded that the club receives a subsidy, as many of its members are B.O.A.C. navigators and B.E.A. radio officers whose flying training is paid for by the two airways corporations.

ONE of the many clubs adversely affected by bad weather in September and October was the Plymouth and District Aero Club, whose private-flying activities during the period May-October totalled 630 hr. "Fortunately," writes the secretary, Mr. Pearse, "other activities such as charters, pleasure flights, etc., brought a further 350 hr." This year, for the first time, the club provided recreational flying for R.N. cadets from Dartmouth, and it has also continued to receive its quota of A.T.C. pupils. The club operates from Roborough, which will be the venue of the annual Christmas party on December 19th, and is also a monthly meeting-place for the Plymouth branch of the Aircraft Recognition Society. A film show will be held there on December 4th.

DURING October, hours flown by members of the Strathtay Aero Club totalled 100, in spite of the severe gales and generally turbulent weather which have postponed several first solos. Three private licences were obtained during the month, one of these by an A.T.C. cadet.

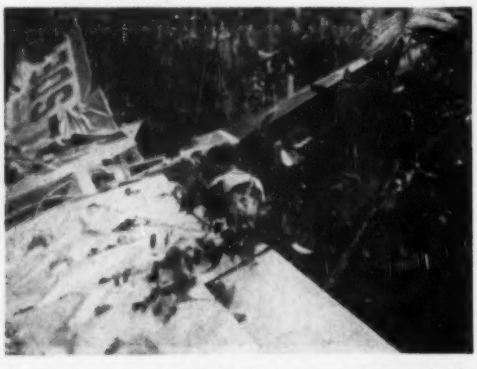
WE give below a further list of those who have qualified for the new categories of Pilot's Certificate introduced by the Royal Aero Club earlier this year. The column headed "Cl." (class) refers to the particular type of certificate awarded.

No.	Name	Cl.	Date	No.	Name	Cl.	Date
28,251	E. J. Furlong	2	1.10	28,263	P. Stead	2	21.10
28,252	J. M. H. Heines	1	1.10	28,264	J. R. Lyon	4	21.10
28,253	A. N. Menear	4	1.10	28,265	A. R. Miller	4	21.10
28,254	R. J. Morton	2	7.10	28,266	N. J. Jones	2	22.10
28,255	K. V. Daniell	1	7.10	28,267	E. E. Jones	3	23.10
28,256	N. A. Rogers	1	7.10	28,268	W. H. Byars	1	23.10
28,257	C. J. V. Gray	1	13.10	28,269	G. L. Auty	1	28.10
28,258	M. W. C. Alger	1	13.10	28,270	P. P. Sidebottom	3	29.10
28,259	J. L. B. H. Cordes	1	15.10	28,271	D. A. Greville-Heygate	2	29.10
28,260	B. D. Pischel	1	16.10				
28,261	J. D. Bungard	3	16.10	28,272	J. Bennett	1	30.10
28,262	J. E. M'Kenzie-Hall	1	16.10	28,273	W. Roche-Kelly	1	31.10
28,249	D. V. Allen	2	17.10				

DOWN in the FOREST

AN Auster aircraft, whilst on a return flight from Malacca to Singapore quite recently, ran out of fuel a few miles from the town of Labis in North Johore, and the pilot was forced to put down in thick jungle a few hundred yards from the fringe of a rubber estate. The very density of the jungle saved the lives of the pilot and his passengers; the starboard wing struck a big tree, causing the aircraft to spin round, and at the same time the main impact was broken by the numerous saplings into which the machine ploughed.

Finally the aircraft came to rest with its nose in the ground and tail raised, but fortunately for all concerned, the right way up. The pilot and his two passengers, one of them a girl, clambered out of the wreck; the girl, though she had been in the rear seat, was the most seriously hurt of the three.



"By one chance in a million," as related above, there happened to be a forestry track, leading to an estate bungalow, near the scene of this Auster's forced-landing in the Malayan jungle.

Unless a useful moral is pointed, we seldom devote space to accidents, believing that the lay Press plays its part more than adequately. But we feel that this little account from a reader in Malaya, Mr. Roy Sampson, deserves to be put on record; not only does it show that a light aircraft can be put down in a forest and its occupants live to tell the tale, but it also indicates that in these troubled times pilots in Malaya have to face more than the normal hazards of trans-jungle flying.

By that one chance in a million which so often happens, the crash had taken place right beside an old forestry track, along which the three survivors were able to make their way, until they reached an estate boundary road. Here the pilot left his companions in order to procure help. Night had fallen before he had covered the first few miles, and it was with a feeling of relief that he finally saw the lights of an estate bungalow about a mile away.

But his troubles were not yet over, for, upon approaching this bungalow, he was heard by the Malay Special Constable sentries who were on duty. They at once opened fire, thinking that a party of bandits was approaching with the intention of attacking them.

After a time the firing ceased, the sentries having realized that their fire was not being returned. Luckily the pilot was not hit, but, being unable to speak Malay, he was unable to explain who he was and what he was doing there.

The estate security officer, attracted by the firing, then arrived on the scene in his jeep; he quickly discovered what had occurred and summoned help from other members of the estate staff who arrived in miscellanous armoured vehicles, and who, guided by the pilot, proceeded to the place where the two passengers were awaiting.

The Auster's crew spent the remainder of the night on the estate, and next morning were taken away to hospital. After they had gone one of the Malays remarked, "they must have lived very good lives those people, for Allah to guard them the way he did."

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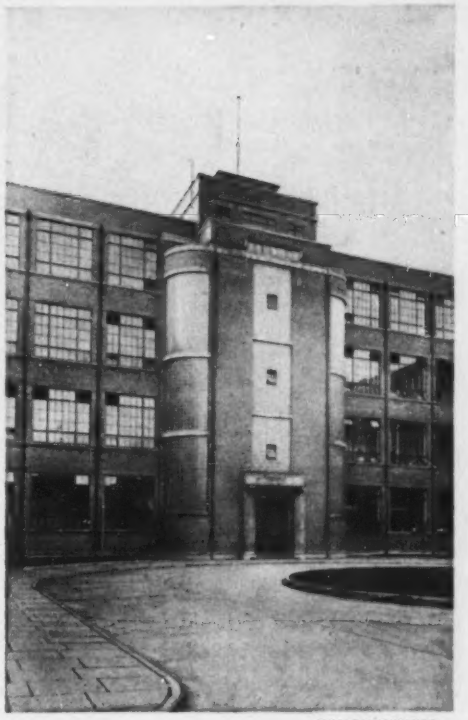

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SERVICE AVIATION

Royal Air Force and Naval Aviation News

Staff College Appointment

ON completion, next month, of his course at the Imperial Defence College, A. Cdre. W. C. Sheen, D.S.O., O.B.E., is to become Assistant Commandant of the R.A.F. Staff College, Bracknell, Berkshire.

A. Cdre. Sheen entered the Service as an aircraft apprentice in 1923 and was selected for training as a pilot in 1927; later he obtained an A.1 grading at C.F.S. He was awarded the D.S.O. in September, 1940, while commanding No. 61 Squadron.

Canberra Goodwill Tour

MEMORABLE in an already exceptional tour was the reception at Santiago, Chile, of the four English Electric Canberras of Bomber Command that are now on a goodwill mission in South America. A large crowd had gathered at Los Cerrillos airport to greet the Canberras—the first jet-propelled aircraft ever to fly over Santiago. The Chilean government had provided a guard of honour to welcome A. V-M. D. A. Boyle, who is leading the mission, and Mr. Norman Stirling, the British Ambassador, was there on behalf of the British residents in Chile.

A military parade was held when the outgoing President of Chile, Sr. Gonzalez Videla, handed over to the newly-elected General Carlos Ibanez. At this parade three of the Canberras flew past in formation in salute to the new President. Colonel Ortiz, C-in-C. of the Chilean Air Force, was flying in one of the aircraft.

A.P.R.A.'s Sixth Dinner

THE principal guests at the Air Public Relations Association's dinner, held at the Press Club, London, on Friday last, were Sir Miles Thomas, D.F.C., chairman of B.O.A.C., and Air Chief Marshal Sir Hugh Pugh Lloyd, K.C.B., K.B.E., M.C., D.F.C., LL.D. A. Cdre. Lord Willoughby de Broke, M.C., A.F.C., J.P., was in the chair.

Proposing the toast of the Royal Air Force, Sir Miles Thomas—one of only two people present wearing a Royal Flying Corps tie—recalled one of his early experiences as a pilot. "I have," he said, " a vivid memory of a day in the 1914-18 war when I somewhat unceremoniously landed an aircraft in a part of the world which by repute is the Garden of Eden.

"At that time I was stationed at Baghdad and was chosen to fly the Chief Political Officer, Sir Arnold Wilson, later rear-gunner Sir Arnold Wilson, to an area near the confluence of the Tigris and the Euphrates. I was to fly over some Arabs at a very low altitude and exercise public relations by dropping leaflets telling them to stop carrying out raids, to pay their taxes, and to be good citizens.

"Unfortunately, the heat of the desert was too much for the engine of the aeroplane in which we were flying and it seized on full throttle. I tried to make a landing on what looked like level ground alongside a stretch of water. It turned out to be not firm ground but soft mud—and the aeroplane turned base over apex. No bones were broken, however, and the political officer and I were taken by natives to a chieftain's hut, where we were fed.

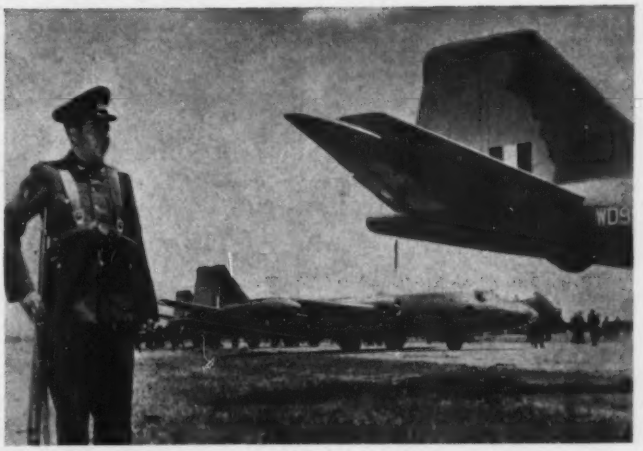
"I have since been told that I am probably the only man to have forced landed in the Garden of Eden—and upside down at that !"

Speaking of Britain's world lead in pure jet and turboprop transports, Sir Miles said that B.O.A.C. was already examining specifications for a civil version of the Avro Vulcan delta, which, he thought, in the years to come might be in wide demand.

Sir Hugh Lloyd, replying on behalf of the Royal Air Force, said there was nothing in any air force of the world to equal the Valiant and Vulcan as bombers. He stressed the desirability of lessening bombing error to ensure economy of effort, and pleaded for development in bombing technique.

To support his argument, he pointed out that German bombers over this country in 1917 took 58 minutes to fly from North Foreland to London and then each had 6 cwt of bombs to drop. Translated into terms of modern jet-propelled bombers and atom bombs, the 58-minute journey was now reduced to six minutes and the bomb load of each aircraft would equal 20,000 tons of H.E. bombs.

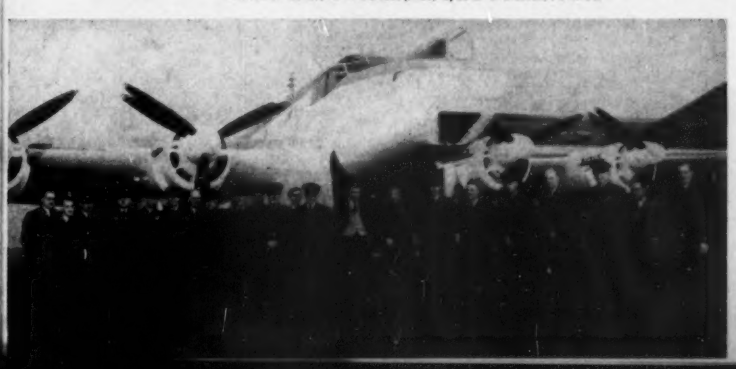
But, he pointed out, bombs were still dropped in free fall, development of bombing techniques not having kept pace with those of engine and aircraft. "We have got to get away from this free-falling-bomb business," he declared, "and put as much effort as we can into the guided bomb as quickly as possible. I am sure it can be done."



AT SANTIAGO : During the recent goodwill visit to Chile of the four Canberras from Bomber Command, members of the Chilean Air Force mounted guard over the aircraft at Santiago.

A.V-M. C. R. SLEMON, who has been appointed to succeed Air Marshal W. A. Curtis as Chief of the Air Staff of the R.C.A.F.

S.A.A.F. IN BRITAIN : A South African Air Force mission is at present visiting various aeronautical establishments in this country. Members are seen here in front of a Shackleton Mk 2—examined, it is to be hoped, with a prospective customer's eye—during a visit to the Avro airfield at Woodford, Cheshire. Those in the line are, left to right (S.A.A.F. unless otherwise mentioned) :— Mr. J. B. Waterhouse, Atlanta Industries (Pty.) Ltd., Johannesburg; Mr. P. Kidson, A.V.Roe; Lt. Besstie; G/C. Smith, R.A.F. escorting officer; Capt. H. Knight; Capt. C. Bond; Mr. J. Rimmington, A.V.Roe; Capt. S. P. Prinsloo; Maj. H. T. Snyman; W/C. Higginson, R.A.F.; Cmdt. H. Woodward; Mr. D. Andrew, A.V.Roe; Cmdt. Newman-Thomas; Mr. J. A. R. Kay, A.V.Roe director; Cmdts. D. A. Loftus; Capt. Bayford (S.A.A.F. London H.Q.); Mr. J. H. Orrel, A.V.Roe chief test pilot; Maj. Stableford; Mr. C. J. Wood, A.V.Roe; Capt Broadhurst; Mr. J. D. Baker, A.V.Roe test pilot; G/C. E. C. Dearth, A.V.Roe.



SERVICE AVIATION . . .

Flying Boat Training

IT has been announced that two officers of the Royal New Zealand Air Force are coming to Britain to take a flying-boat course with the R.A.F. Flying in Sunderlands, they will learn the latest reconnaissance and anti-submarine tactics.

A.V-M. W. E. Staton

IT has been announced that, at his own request, A.V-M. W. E. Staton has retired from the R.A.F. He feels that his retirement will in some measure facilitate the promotion of younger officers. A.V-M. Staton will best be remembered for his great interest in the Royal Air Force Small Arms Association, of which he is chairman.

No. 210 A.F.S. Opens

UNDER the command of G/C. C. R. Hawkins, No. 210 Advanced Flying School has recently opened at Tarrant Rushton, Dorset, the airfield where Flight Refuelling, Ltd., have their base.

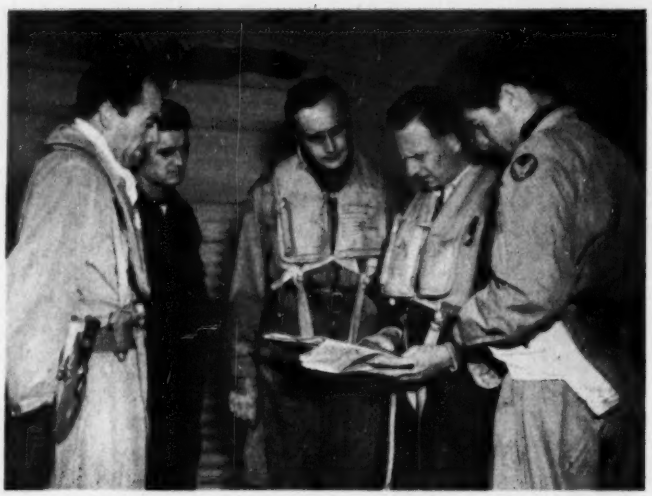
The school will use Meteor 3s and 7s and Vampire 5s. Ground maintenance and catering are being provided by Flight Refuelling, Ltd., and the trainee pilots are billeted at Grimsditch, near Salisbury.

More New Zealand Trainers

SOME 40 of the 99 Harvards which the R.N.Z.A.F. have in store are to be reconditioned and taken into service. The re-conditioning of the remaining 59 will be considered later. The New Zealand Minister of Defence, Mr. T. L. Macdonald, has said that, in view of the decision to build up fighter/ground-attack squadrons, the R.N.Z.A.F. will continue to require a single-engined trainer.

Scottish R.A.F. Museum

A SECTION of the Scottish United Services Museum at Edinburgh Castle is to be devoted entirely to the history of Scottish units of the R.A.F. and will include exhibits ranging from early and modern uniforms and badges, model operational aircraft to war trophies. This section was opened on Saturday last by the Duke of Hamilton, Honorary Air Commodore of No. 602 (City of Glasgow) Fighter Squadron, No. 2602 (Glasgow) L.A.A. Squadron, and No. 3602 (Glasgow) Fighter Control Unit, R.Aux.A.F.



ROCKETEERS of No. 77 Squadron, R.A.A.F., operational in Korea, discuss a target which they propose to deluge with R.P.s launched from their Meteor 8s. From left to right they are: F/L. Peter Cooney; P/O. Bill Simmonds; F/O. Bill Holmes, an R.A.F. pilot on attachment; F/O. Dick Turner (who seems to take a poor view of the target's situation); and P/O. John Slater. It will be seen that Bowie knives, revolvers, American Mae Wests and American flying suits are the order of the day.

A.V-M. SIR ROBERT A. GEORGE—who, until last April, was British Air attaché in Paris for seven years—in conversation with M. Pierre Montel, the French Secretary of State for Air, after being presented with the insignia of the Legion d'Honneur.

"Flight" photograph

MODERN PINNACE: A Westland Sikorsky S-51 of No. 705 Squadron drops a man aboard a naval lighter carrying two of the ten new Sikorsky S-55s brought to Britain in the S.S. American Producer. The S-55s are for No. 848 Squadron, R.N., destined for Malaya.

Coronation Naval Review

THE Queen's approval has been given to a Coronation naval review to be held at Spithead. Only one battleship is expected to be present—the 42,500-ton *Vanguard*—but five or six aircraft carriers are likely to take part. There will be a fly-past by naval aircraft, including helicopters.

Malayan Operations

DURING the month of October requests from an increasing number of ground units were responsible for a marked rise in the total of offensive sorties being flown against a wide variety of targets by R.A.A.F. Lincolns and R.A.F. Brigands, Hornets and Vampires. During the same period the amount of supplies dropped by R.A.F. Valettas and R.A.A.F. Dakotas to dropping zones, jungle clearing and police posts also showed an increase. The main target areas were in the states of Selangor and Johore.

A number of operations took place in Perak and Pahang. During the month, in addition to day strikes, Lincolns made five night strikes and, at the end of the month, a full-scale concentrated attack on an important terrorist target in Johore. Supply-dropping Valettas of the R.A.F., and R.A.A.F. Dakotas, dropped a total of 338,008 lb of supplies to the ground security forces and to permanent police posts during the month. A total of over three-quarters of a million surrender leaflets was also dropped, of which some 30,000 were distributed in the Kulin area of Kedah by Harvard pilots of the Pahang Squadron, Malay Auxiliary Air Force.

On October 15th three Valettas flew 52 paratroopers of No. 22 Special Air Service Regiment to Kelantan, where the troops were successfully dropped in five zones. Austers carried out a number of communication and reconnaissance flights and helicopters of the Far East Casualty Evacuation Flight flew five casualties—four Malays and one Chinese—from jungle clearings. A large number of photographic sorties were also flown.

The Story of "Boom"

AN account of the various enterprises with which Marshal of the Royal Air Force Lord Trenchard has been connected is being written by Maj. J. G. Lockhart. The subject-matter will include the formation of the R.A.F., the re-organisation of New Scotland Yard, the opening-up of Nigeria and Lord Trenchard's service in the Army.

Major Lockhart would be grateful if anyone in possession of relevant documents, or other material, would send them to Mrs. Hilary St. George Saunders, 4 Cresent Mansions, 113 Fulham Road, S.W.3. All material thus sent will be returned.

THE AERONAUTICAL BOOKSHELF

Sir Philip Joubert Remembers

"The Fated Sky," by Air Chief Marshal Sir Philip Joubert de la Ferté. Hutchinson and Co., Stratford Place, London, W.1. Illustrated. Price 18s.

THIS would have been a better book if its author had made up his mind what he was going to write before he started. But let us hasten to add that it is still worth reading, for it begins as Sir Philip's autobiography, and the first 200 pages or so are full of interesting sidelights on life in the R.F.C. and R.A.F. from 1912 to 1939. After that, it tails off into his personal account of Coastal Command's part in the Battle of the Atlantic in 1941-42 and the final stages of the land battle for Burma.

There may be a reason for this. Sir Philip's unique series of wartime appointments—Assistant Chief of Staff (Radar), C-in-C. Coastal Command, Inspector General of the R.A.F., and Deputy Chief of Staff (Information and Civil Affairs), S.E.A.C.—may have presented him with an armoury of axes that are best left unground. But the reader cannot avoid disappointment, for those years *should* have provided one of the most interesting chapters.

Sir Philip was no mere "chairborne" commander. Before entering the R.F.C. in 1912, he took a post-graduate course on monoplanes, after obtaining his "ticket" at his own expense in a Bristol Box-kite—a formidable achievement which, including all preliminary tuition, totted up to 1 hr 50 min of flying! He was posted to No. 3 Squadron and, after instruction by Perryon and Pégoud at the Blériot School in Paris, where pilots were taught to taxi in a clipped-wing, non-flying 25 h.p. "Penguin," he took over one of the squadron's Blériot monoplane scouts. In this aircraft, with Sgt. Laws (now G/C. Laws, head of the Air Survey Co.), he made pioneer photo-reconnaissance experiments, and later continued them operationally in France, after flying the Channel with a motor-car inner tube as a life-jacket.

Some 110 pages and 25 years later, there are fascinating sidelights on the development of our first radar stations, which interested the Germans so much that the *Graf Zeppelin* cruised over the North Sea, watched by the stations and herself plotting their positions. There are other good stories, including one about a zealous young U-boat sailor who was ordered to deal with a Catalina's depth-charge, which had lodged on the submarine's deck. Having dislodged it, he pushed it overboard—where, being a depth charge, it promptly blew up and sank the U-boat. Such anecdotes are, unfortunately, all too rare in the last 80 pages.

Air Hostess Returns

"Wider Horizons" by Margaret Morrison. Published by Hutchinson and Co. (Publishers) Ltd., Stratford Place, London, W.1. Price 10s 6d.

IN 1940 appeared a novel called *Flying High*, which was perhaps the first book to be based on the life of an air-hostess. Since then over 100,000 copies have been sold—many of them, no doubt, to readers of this journal. Those who were introduced to the heroine and followed her adventures in the service of K.L.M. will be interested to know that her creator, Miss Margaret Morrison, has continued the story in *Wider Horizons*. The new book, set in 1946, tells of the former hostess' visit to her pre-war employers and describes the reconstruction of the airline against the background of destruction and privation which afflicted Holland at that time. Actuality is the keynote of Miss Morrison's writing; nearly all the characters are real (some appear under their own names) and at times the style verges on straight reporting. *Wider Horizons* is dedicated to Dr. Albert Plesman, president of the airline which figures so prominently in this book and its predecessor.

U.S. Navy Identification

"Ships and Aircraft of the U.S. Fleet, 1952 Supplement," by James C. Fahey. Ships and Aircraft, Washington, U.S.A. Obtainable from F. B. Beaumont, 59 Russell Road, Forty Hill, Enfield, Middlesex. Price 2s 3d.

THIS new eight-page supplement contains photographs and data on all U.S. Navy ship and aircraft developments since the sixth edition of Jim Fahey's splendid reference volume *The Ships and Aircraft of the U.S. Fleet* was published in the summer of 1950. Some of the information, especially on new turboprop engines, is right up to the minute, and the 30 aircraft illustrations include interesting new pictures of the Skyshark, XA2J-1 Savage, R4Q-1 Packet with revised fin extensions, and the full range of naval helicopters. Among the ships, the giant 70,000-ton flush-deck carriers and sub-killing submarines, with elaborate radar and homing torpedoes, are of particular interest.

Copies of the sixth edition of the book, complete with this supplement, are still obtainable at 15s. 6d. each. They contain specification data and pictures of every ship and aircraft, including variants, currently in service with the U.S. Navy.

OTHER BOOKS RECEIVED

Photograms of the Year 1953 (published for *The Amateur Photographer* by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 12s 6d.).—Containing 96 art plates representative of top-flight work by the world's most skilled photographic artists, this annual publication will make a most acceptable Christmas gift. In addition to the reproductions, there are 32 pages of articles of interest to photographers.

The 1952 edition of *Aircraft Engines of the World*, by Paul H. Wilkinson, has recently been published, at 50s, by Sir Isaac Pitman and Sons, Ltd. It contains illustrations, data and information concerning the world's latest gas turbines and reciprocating engines, together with tabulations of aviation fuels and lubricants.

The A.B.C. of Model Aircraft Construction, by the Rev. F. Callon (Model Aeronautical Press, Ltd., 38 Clarendon Road, Watford, Herts. Price 5s).—A practical and copiously illustrated guide for the novice aeromodeller; unlike so many comparable books, it does not skate over simple points which may be obvious to the author but puzzling to the reader.

Workshop Practice, Vol 3, by A. E. Peatfield (English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4. Price 6s).—Published in the "Teach Yourself" series, and introducing methods and procedure practised in engineering workshops. Two complementary volumes are *Hand Tools* and *Engineering Components and Materials*.

Mathematics for Telecommunications, Vol. 1, by D. F. Spooner and W. H. Grinsted (English Universities Press, Ltd. Price 10s 6d).—Based on the syllabus of the City and Guilds of London Institute examination in mathematics for Telecommunications I, this volume for home study and correspondence-course students as well as for class work in technical schools and colleges.

Our Neighbour Worlds, by V. A. Firsoff, M.A. (Hutchinson's Scientific and Technical Publications, Stratford Place, W.1. Price 25s).—An astronomer assesses the possibilities of interplanetary travel in relation to current astronomical knowledge. Presented in an understandable but not too elementary form, the subject-matter should please both the expert and the reasonably intelligent non-technical reader.

Car Driving as an Art, by S. C. H. Davis (Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 10s 6d; postage 5d).—"Sammy" Davis of *Flight*'s associate journal *The Autocar* has drawn upon his many years of motoring experience to produce this book on roadcraft, not only for the beginner but also for the more advanced driver who thinks he "knows it all." Chapters on "care, maintenance and diagnosis" and "going foreign" are included. A practical Christmas gift.

Wind-Tunnel Technique, by R. C. Pankhurst and D. W. Holder. Pitman. Price 12s.

Observer's Handbook. H.M. Stationery Office, York House, Kingsway, London, W.C.2. Price 12s. 6d.

Rocket Propulsion, by Eric Burgess. Chapman and Hall, 37 Essex Street, London, W.C.2. Price 21s.

The Technograph System of Printed Circuits. Technograph Printed Circuits, Ltd., 32, Shaftesbury Avenue, London, W.1.

Engines for Power and Speed, by F. E. Dean. Temple Press, Ltd., Bowling Green Lane, London, E.C.1. Price 9s. 6d.

Pilotage—Aero Nautique a l'Usage des Pilotes. Editions Eyrolles, 61 Boulevard Saint-Germain, 61, Paris 5e.

Aircraft Instrument Design, by W. H. Coulthard. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2. Price 40s.

War Crimes Trials Vol. IX—The Dulag Luft Trial, Edited by Eric Cuddon. William Hodge and Co., Ltd., 86, Hatton Garden, London, E.C.1. Price 18s.

The Technique of Design, by P. J. Wallace. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.1. Price 12s.

ENCOURAGEMENT FOR APPRENTICES: Sir Roy Fedden, at the Dowty prize-giving (see first item below) hands an award to apprentice R. G. Baker. Mr. G. H. Dowty, chairman and managing director of the Company, is seated on the right.

ETHIOPIAN PUPIL Makonnen Gabremikael receives his A.S.T. certificate of competency from Air Marshal Sir Hugh S. P. Walmsley, managing director, in the presence of W/C. S. P. Jenkins, director (training). (See "Ethiopian Occasion".)

THE INDUSTRY

Dowty Apprentices' Prizegiving

THE third annual apprentices' prizegiving of Dowty Equipment, Ltd., took place at Arle Court, Cheltenham, on November 14th. Sir Roy Fedden made the presentations, and a number of Dowty executives were also present, including Mr. G. H. Dowty (chairman and managing director).

Over 60 per cent of apprentices in all courses had passed their examinations at the end of the training year. Three had won prizes at the North Gloucestershire Technical College, while two others had obtained Higher National Certificates.

"I am convinced," Sir Roy told the apprentices, "that here you can get training as good as, or better than, anywhere else. The field is wider, not so specialized, and you will get more personal training than in one of the very big factories."

Ethiopian Occasion

THE first of five Ethiopian students nominated by their Government for I.C.A.O. fellowships in advanced flying training has completed the course—at Air Service Training, Hamble—which the nominees began in May, 1951. He is Mr. Makonnen Gabremikael, and he was one of the first pilots at Hamble to be trained on one of A.S.T.'s three Dakotas. The five students were previously pilots in the Imperial Ethiopian Air Force, and their A.S.T. course is up to the standard of the Senior Commercial Pilot's Licence with instrument rating. The remaining four are expected to complete their training in the near future.

The I.C.A.O. agreement which approved the grant of the fellowships was signed in February, 1951, and included provision for further fellowships; three for training in air-traffic control, and one for study in civil aviation administration. The Government of Ethiopia has not yet nominated candidates for these four additional fellowships.

A New Foundry Technique

AMONG the exhibits at a plastics exhibition recently held at Newcastle-upon-Tyne was a display showing the new "shell" method of making foundry moulds, from a mixture of sand and Bakelite synthetic resin. Based on a German invention found by an Allied research team after the war, the technique is still in a comparatively early stage of development, but is said to have produced remarkable results; in America it is already being used by a number of foundries.

Basically the process depends upon the heat-hardening properties of powdered synthetic resins, a suitable grade of which has been specially developed in this country by Bakelite, Ltd. (12, Grosvenor Gardens, London, S.W.1.). When a small proportion of these resins is mixed with sand and dropped on to a heated metal pattern, the thermosetting properties of the resins cause a thin crust to be formed, which can then be completely hardened in a few minutes by the application of additional heat. The shell thus produced forms a half-mould, and when two of these are clamped together by any suitable means the mould is ready for pouring. The moulds remain sufficiently rigid during pouring for very accurate casting, though their breakdown is at the same time rapid enough to eliminate the need for knockout.

Hollow cores are produced by suitable variations of this technique and can be made as easily and rapidly as the moulds. Speed is, in fact, claimed to be one of the big advantages of the process and, in general, complicated designs can be produced as easily as simple ones. The finish is particularly clean.

The Cost of Research

SOME striking figures concerning the cost of research and prototype-development were quoted by Sir Richard Fairey in his speech to shareholders at the recent annual general meeting of the Fairey Aviation Co., Ltd., in London.

"I have often referred," he said, "to the question of research and development and the vital need for an aircraft company to maintain its position by the periodic introduction of new types of aircraft and apparatus. As I explained last year, your Board then considered that the company's proportion of such expenditure had, in recent years, been disproportionate to that of the Government and now this matter has been adjusted to some extent. Since the war we have spent some £2¼ million in research and development of which about one-third only has so far been recovered, although further recoveries are due to us from the Government in the future.

"Present-day aircraft, particularly of the naval types we specialize in, are of extraordinary complexity and refinement; prototypes may cost £1 million or more, and this cost is rising. Today the radar equipment of a military aircraft can cost as much as the whole aeroplane built for the same purpose during the War. The aviation business is passing through a stage of rapid development due largely to the introduction of the gas turbine and the results of scientific research. It follows that we must face our share of the expenditure in order to keep our place and make proper provision for the future."

IN BRIEF

AT a recent Board meeting of Lodge Plugs, Ltd., Mr. Victor Martin-Jones, technical sales manager, who has been with the firm since 1938, was appointed an executive director of the company.

* * *

Mr. A. W. Fraser, A.F.R.Ae.S., A.F.I.Ae.S., informs us that he is relinquishing his appointment with the Bristol Aeroplane Co., Ltd., in order to take up a post as a senior designer with the de Havilland Aircraft Co., Ltd., at Hatfield.

* * *

News from the apprentices section of Short and Harland, Ltd.: K. Campbell (indentured apprentice, machine shop) has been awarded the Captain J. S. Davidson Memorial Exhibition; aeronautical engineering apprentice D. B. Kirkpatrick (research department) has been awarded a flying scholarship by the Air Ministry, and will be trained under W/C. Lindsay in the company's aircraft; and Douglas Lewis, M.Sc., who has recently returned from the University of New York, which he attended on an E.C.A. Scholarship, is now filling a post in the company's production department.

* * *

A "combined industrial catalogue" (PD 3444) has been issued by the Industrial Group of Philips Electrical, Ltd. (Century House, Shaftesbury Avenue, London, W.C.2). It consists of 32 illustrated pages setting out the full range of Philips industrial products under section headings, such as arc welding, resistance welding, H.F. heating, etc. The leaves are loosely bound and in a cover which will permit subsequent additions and amendments. Also recently published are the new revised *Arc Welding Catalogue* (PD 3515), showing the recent additions to Philips arc-welding equipment, and a special *Arc Welding Electrode Wall Chart*.

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Postal Orders and cheques sent in payment for advertisements should be made payable to Iliffe & Sons, Ltd., and crossed & Co.

Trade Advertisers who use these columns regularly are allowed a discount of 5% for 13, 10% for 26 and 15% for 52 consecutive insertion orders. Full particulars will be sent on application.

Box Numbers. For the convenience of private advertisers Box Number facilities are available at an additional charge for 2 words plus 1/- extra to defray the cost of registration and postage, which must be added to the advertisement charge. Replies should be addressed to "Box 0000, c/o Flight," Dorset House, Stamford Street London, S.E.1.

The Publishers retain the right to refuse or withdraw advertisements at their discretion and do not accept liability for delay in publication or for clerical or printer's errors although every care is taken to avoid mistakes.

Situations Vacant. The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service etc. if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

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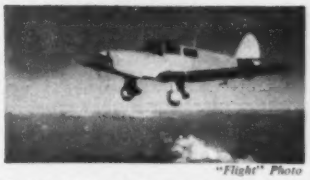

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PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

APPLICATION No. 114 from Flightways, Ltd., of Southampton Airport, Eastleigh, Hants, for a normal scheduled service with D.H.89 aircraft for the carriage of passengers, supplementary freight and mail between Southampton (Eastleigh) and Le Havre (Octeville), at a frequency of from two to 16 services weekly, during the period from April 1st, 1953 to March 31st, 1960.

FROM Hunting Air Transport, Ltd., of 68, Pall Mall, London, S.W.1:—

Application No. 115 for an all-freight service initially with D.C.4 and later D.C.6A and/or Super Constellation aircraft for the carriage of freight between London and New York (Idlewild), at a frequency of from two to seven services weekly, during the period from June 1st, 1953 to May 31st, 1960.

Application No. 116 for an all-freight service initially with D.C.4 and later D.C.6A and/or Super Constellation aircraft for the carriage of freight between London and Montreal (Dorval), at a frequency of from two to seven services weekly, during the period from June 1st, 1953 to May 31st, 1960.

APPLICATION No. 117 from William Dempster, Ltd., of 65, New Cavendish Street, London W.1, for a normal scheduled seasonal service with Dakota aircraft for the carriage of passengers and supplementary freight between London (Stansted) and Innsbruck with intermediate traffic stops at Luxemburg and Salzburg at a frequency of from one to three services weekly, during the period from April 1st, 1953 to March 31st, 1960.

APPLICATION No. 118 from Birkett Air Service, Ltd., of 227, Acton Lane, London, W.4, for a U.K. internal service, initially seasonal, with D.H.89A aircraft for the carriage of passengers, supplementary freight and mail between London (Croydon) and Exeter with an intermediate traffic stop at Southampton (on demand) at a frequency of up to 12 services weekly, during the period from June 19th, 1953 to September 21st, 1959.

THESE applications will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections. [0065

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APPLICATIONS are invited from experienced A and/or C licensed engineers for ground and flying duties; preferably, but not essentially, endorsed for Bristol 170, Hercules engines.—Write for interview, all expenses will be paid, to Manager, Blackbushe Airport, Camberley. [8959

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STRESSMEN of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

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WRITE, stating age, qualifications and details of experience, to Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2.

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(2) ASSISTANT purchasing officer (disposals). Qualifications required are proven sales ability and sound knowledge of production control, stores and buying methods. Knowledge of aircraft and equipment desirable. Salary scale £9 9s. 0d.—£11 14s. 0d. per week.

SUCCESSFUL candidates, who will be expected to travel frequently in U.K. and abroad, will be based eventually at London Airport. Applications, giving full details of age, experience and qualifications, to Chief Personnel Officer, B.E.A., Keryline House, Ruislip, Middlesex. Closing date: December 5th, 1952. [8942

AIR TRAINERS, Ltd., Bicester Road, Aylesbury, have the following vacancy:—

PLANNING engineer, with estimating experience, knowledge of machine shop practice and aircraft instrument assembly preferred.

APPLY in writing, giving full details of experience and salary required, to the Personnel Officer. [8954

LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex. Apply by letter or telephone to the Senior Radio Engineer, Aviation Traders, Ltd., Southend Airport, Essex. Tel.: Rochford 54491. [0950

TECHNICAL illustrator required, aged 23 or over, with considerable practical experience.—Applications, in writing to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds., stating age, experience and salary required. [0943

CHIEF technician, aircraft accessories. Knowledge of heat transfer and aerodynamics essential. Please apply in writing, stating age, experience, and qualifications to Delaney Gallay, Ltd., Edgware Road, Cricklewood, London, N.W.2. [8939

AIRCRAFT or mechanical draughtsmen required, all grades. Apply, stating age, experience and salary required to The Chief Draughtsman, Alan Muntz and Co., Ltd., Aircraft Division, Langley Aerodrome, Slough, Bucks. [0950

SENIOR and intermediate design draughtsmen with good experience of aircraft or light structural or mechanical engineering, required for aircraft and armament project work.—Apply by letter to Portsmouth Aviation Ltd., The Airport, Portsmouth. [0938

HANDLEY PAGE, Ltd., have a vacancy at their Radlett (Herts.) Aerodrome for flight observer. Previous experience in this type of work essential.—Write, stating age and full details of experience, to Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. [8968

APPLICATIONS are invited for position as chief inspector for West Midland aircraft firm. Previous aircraft inspection experience essential; position demands a person to take charge.—Reply with full details, Box 3921. [8958

WESTLAND AIRCRAFT, Ltd., Yeovil, Somerset, require strengthmen, junior and intermediate draughtsmen and technical writer.—Applications, stating age, experience and salary required, should be addressed to the Personnel Officer. [8965

GLOSTER AIRCRAFT Co., Ltd., have vacancies for aircraft design draughtsmen and electrical draughtsmen.—Write, giving full details of previous experience, age and salary required, to Employment Officer, G.A.C., Ltd., Hucclecote, Glos. [0910

JIG and tool draughtsmen, fully experienced, required Percival Aircraft, Ltd., Luton Airport, Beds. Good working conditions and full welfare facilities, including staff pension scheme.—Applications to the Personnel Manager, stating age, experience, salary required. [0600

SENIOR spares schedule clerk, capable of taking charge of compilation section, required by Percival Aircraft, Ltd., Luton Airport, Beds. Good welfare facilities, including staff pension scheme.—Applications, in writing, to Personnel Manager, stating age, experience and salary required. [0597

LANCASHIRE AIRCRAFT CORPORATION, Ltd. (Skyways of London), are now appointing additional navigating officers for their York fleet.—Applications from holders of appropriate M.C.A. licences should be made in writing to the Personnel Manager, Bovingdon Airport, Herts. [0590

ARMSTRONG SIDDELEY MOTORS require technical assistants for research and development on gas turbine combustion systems. Opportunities exist for original work of a highly interesting nature in a new field.—Apply in detail to Reference SA.3, Personnel Manager, Armstrong Siddeley Motors, Coventry. [8966

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0420

AIRLINE pilots—vacancies exist at various Persian Gulf stations for pilots who are holding an Airline Transport pilot's licence or senior commercial pilot's licence endorsed for Dakota aircraft. Preference will be given to single men, but married men will be considered if prepared to accept separation from their families. Emoluments are free of local taxation, and conditions of service include:
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(2) Overseas allowance: single men £300 p.a., married £350 p.a.
(3) Cost of living allowance, rupees 660 or rupees 901 per month according to rank.
(4) Recreational transport and fully furnished air-conditioned quarters at nominal charges.
(5) Free medical services and home leave at the rate of eight weeks for each year's service.
(6) Three-year contract subject to normal termination clauses.

APPLICATIONS in writing should be addressed to the Chief Personnel Officer, British Overseas Airways Corporation, Airways House, Great West Road, Brentford, Middlesex. [8943

ARMSTRONG SIDDELEY MOTORS, Coventry, have a vacancy for a senior designer (mechanical), age 30-35, workshop and aero engine design experience essential, gas turbine knowledge an advantage. For important work on the project design of gas turbine aero engines.—Apply in detail to Reference HSR.1, Personnel Manager, Armstrong Siddeley Motors, Coventry. [8964

OPPORTUNITIES are offered to experienced draughtsmen and designers in the aero gas-turbine field to deal with blade design, engine design, fuel and control systems and weight control. The positions arise in a progressive company in the London area and they are permanent and pensionable.—Write, with full particulars and reference ACJ, to Box 3713. [8956

SITUATIONS VACANT

WEIGHTS engineer required to take charge of weights department, also senior assistant, for work on fixed wing and helicopter aircraft. Good welfare facilities, including staff pension scheme.—Applications, in writing, to Technical Director, Percival Aircraft, Ltd., Luton Airport, Beds, giving details of age, training, qualifications, experience and salary required. [0962]

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience on design of test laboratory equipment desirable. Good welfare facilities including staff pension scheme.—Applications, stating qualifications, experience, age and salary required, to Personnel Manager. [0996]

HANDLEY PAGE (Reading), Ltd., The Aerodrome, Woodley, Reading, have vacancies in their design offices for intermediate and senior draughtsmen, stressmen and loftsmen. They have an interesting project on hand. The positions are progressive and offer good scope for advancement to the right men.—Please send full particulars to the Personnel Officer. [0974]

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds, several draughtsmen with comprehensive experience of engine installations and allied systems. Good welfare facilities, including staff pension scheme. Applications, in writing, stating age, qualifications, experience and salary required, to the Personnel Manager. [0991]

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of piston engine design desirable, but not essential. Also checkers. —Please write, stating age and giving details of previous experience in chronological order to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0930]

ENGLISH ELECTRIC have vacancies for aircraft draughtsmen at Warton Aerodrome, near Blackpool. Men with good aircraft drawing office experience are invited to apply for these interesting positions which carry good salaries.—Write giving full details, quoting reference 120R, to Central Personnel Services, the English Electric Co., Ltd., 1267 Strand, London, W.C.2. [0840]

AIR FORCE. Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen and stressmen, for work on this interesting programme. Good welfare facilities, including staff pension scheme.—Write, giving details of experience and salary required, to Personnel Manager. [0995]

JUNIOR stressman required by Flight Refuelling, Ltd. Qualifications, engineering degree or H.N.C. Should be exempt from military service. Opportunity for keen young man to take part in an interesting development programme. Good salary. Excellent working conditions. Sports club. Possibility married accommodation adjacent airfield later. Cheap fast transport, Bournemouth and Poole areas.—Reply, giving details of age, qualifications, experience and salary expected to Personnel Manager, Tarrant Rushton Airfield, nr. Blandford, Dorset. [0981]

DEVELOPMENT engineers, designers, draughtsmen and modification draughtsmen, technicians, technical writers, technical illustrators, technical assistants and stressmen required for aircraft pressurizing, high altitude breathing, etc.—Fully detailed applications with salary required to Personnel Officer, Normalair, Ltd., Yeovil, Somerset. Local interviews arranged where convenient. [0964]

THE DE HAVILLAND AIRCRAFT CO. invites applications for a post in the Structural Test House. Applicants must have had experience of testing airframe components and reporting on same, and under supervision be capable of designing and stressing test rigs.—Apply, stating age, experience and salary required, to Chief Structural Engineer (Aircraft), The de Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts. [0903]

A VARIETY of posts for junior and senior technical assistants have to be filled in an expanding company in the London area which is engaged on aero gas-turbine research and development. Stressmen, development and performance engineers and compressor, turbine and engine testers are invited to apply. H.N.C. or degree preferred.—Write, with full details, quoting reference HSC, to Box 3719. [0811]

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero-engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0932]

INSTRUMENT mechanics required for the overhaul of aircraft instruments. Applicants should have first-class experience on aircraft instruments generally, alternatively, specialized experience on sensitive altimeters and rate of climb indicators. Good wages, canteen.—Write in first instance to the Managing Director, Wynstruments, Ltd., Staverton Aerodrome, Gloucester. [0920]

ELECTRONIC engineers are required for development work on aircraft instruments. They should possess a degree in electrical engineering or physics or higher national certificate or similar qualifications. Previous laboratory experience in physics, electrical engineering or instrument technology would be an advantage. Guildford area.—Send details of qualifications and experience, quoting Ref. E10, to Box 4619. [0966]

DANCER AND HEARNE BROS., Ltd., have a vacancy for an estimator-ratefixer in the aircraft division at Lindsay Avenue, High Wycombe. Applicants must have had practical experience in rate fixing wood and metal aircraft components, both in machine shop and assembly. First rate technical qualifications necessary in connection with incentive bonus schemes. Apply, in writing, stating previous experience to Works Manager. [0951]

SKILLED aircraft fitters required in Cambridge. Must have served apprenticeship or had minimum of eight years' experience (preferably civilian) in trade. Licensed aircraft engineers also required, "A" and "C" licences with endorsement for Auster aircraft essential. Lodging accommodation arrangeable for employees.—Write, stating age and full details of experience to Personnel Manager, Pest Control, Ltd., Bourn, Cambridge (quoting Ad. 7961). [0946]

BRITISH OVERSEAS AIRWAYS CORPORATION have vacancies for pilots below the age of 27. Minimum qualifications include commercial pilot's licence with instrument rating and radio telephony licence. Commencing salary dependent on qualifications—£815 per annum to £935 per annum.—Application should be made in writing to the Chief Personnel Officer, B.O.A.C. Airways House, Great West Road, Brentford, Middx. [0944]

AIRWORK, Ltd., have a vacancy for a person possessing either an Airlines transport pilot's licence, a flight navigator's licence, similar qualifications, or extensive operating experience, who is not averse to a job on the ground in a home-based operations department. Administrative ability is required.—Applications in writing giving fullest particulars should be addressed to The Manager (MS2), Airwork, Ltd., Blackbushe Airport, Camberley, Surrey. [0945]

THE de Havilland Aircraft Co., Ltd., will shortly be opening a drawing office at their Chester factory and there will be vacancies for senior and intermediate draughtsmen who are experienced in the design of aircraft structures, electrical and engine installations, also customers' special requirements for civil aircraft.—Apply in writing, giving résumé of experience, age, etc., to the Chief Draughtsman, The de Havilland Aircraft Co., Ltd., Hatfield, Herts. [0803]

BRITISH EUROPEAN AIRWAYS require an engineering technician for performance and project analysis work on helicopters. Applicants should possess degree in science or engineering (or equivalent). Experience of performance testing, particularly in rotating wing field is desirable. The post entails experimental flight tests on helicopters. Salary scale £555 rising to £720 p.a.—Written applications to Chief Personnel Officer, B.E.A., Keyline House, Rudslip, Middlesex. [0838]

AERONAUTICAL service engineer required for installation, flight testing and servicing of instruments. Practical and theoretical knowledge of A.C. and D.C. amplifier systems and electronic engineering practice essential. Experience of electro-mechanical, servo and synchronous transmission systems together with H.N.C. or equivalent preferable. Must be prepared to travel. Pension scheme.—Apply, with full details to Personnel Manager, Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middx. [0827]

PROJECT engineer required, to be responsible for a laboratory engaged on development of aircraft fuel contents gauges and associated equipment. Applicants should possess qualifications in electrical engineering and/or physics and should have had design and laboratory experience in the application of electronic techniques to airborne equipment.—Apply, in writing, quoting Ref. E8, and giving details of qualifications and experience, to the Chief Develop ment Engineer, Weymouth Gauges and Instruments Ltd., Station Road, Godalming. [0955]

ARMSTRONG SIDDELEY MOTORS, Ltd., have a few vacancies in their stress department for work on strength investigations and calculations on gas turbine aero engines. A degree in mathematics or engineering is the only essential requirement. There are also a few vacancies in the same department for work on the installation and mounting of gas turbines in aircraft. A degree or Higher National Certificate is required, and some experience in the design or stressing of engine installations would be advantageous.—Reply in detail to Reference DRE 2, Personnel Manager, Armstrong Siddeley Motors, Coventry. [0962]

MECHANICAL engineers required by Ministry of Supply at (1) Royal Aircraft Establishment, Farnborough (Ref. C980/32A) for investigation of operational defects arising on aircraft. Knowledge of electrical engineering required; (2) R.A.E. Outstation, Cardington, Beds (Ref. C870/52A) for research on Air Sea Rescue apparatus including inflatable dinghies and ancillary equipment. Ability to perform calculations on inflatable equipment, knowledge of use of fabrics for balloons and dinghies and experience with such equipment desirable. Practical workshop and drawing-office experience an advantage. Qualifications: H.S.C. (Science) or equivalent but H.N.C. or degree in mechanical engineering may be an advantage. Salary within ranges, experimental officer (minimum age 26), £597 to £754. Women somewhat less. Posts unestablished.—Application forms from M.O.I.N.S., Technical and Scientific Register, 26, Kine Street, London, S.W.1, quoting appropriate reference. Closing date December 12 1952. [0967]

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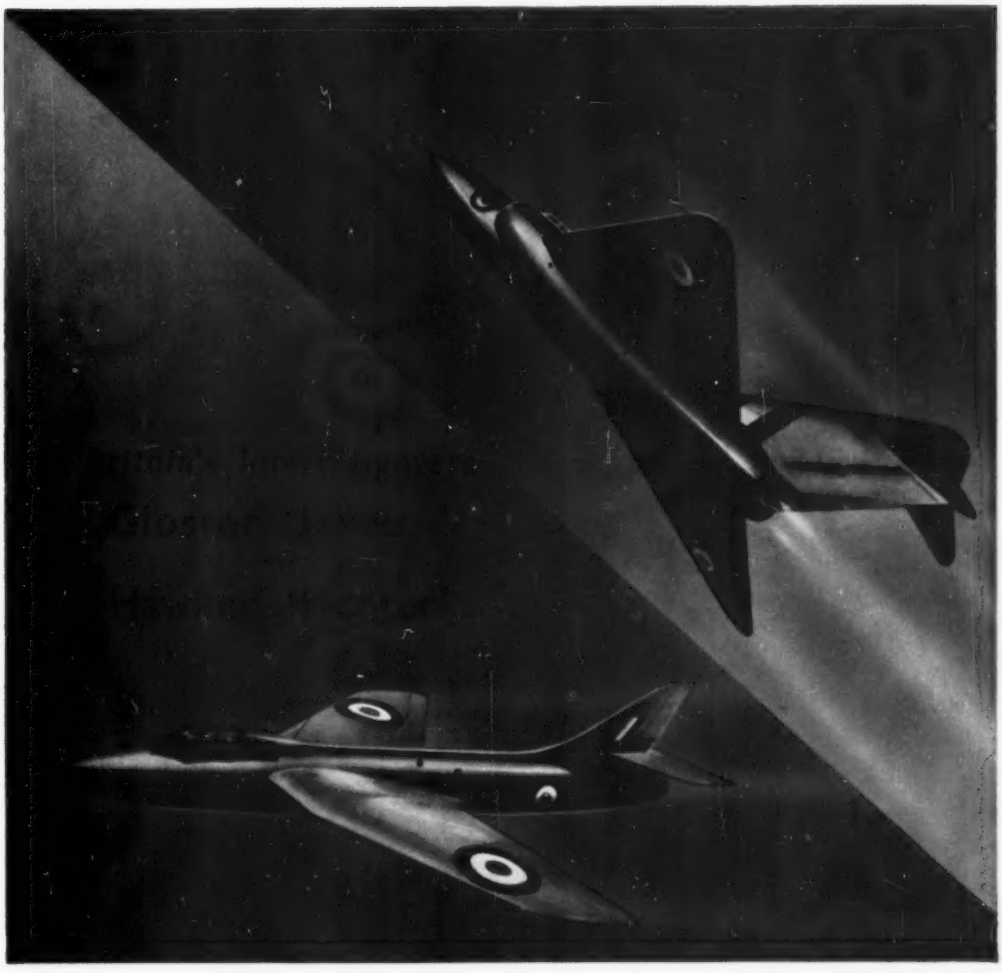

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